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ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

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VOLUME XLI.

JANUARY—JUNE, 1905.

PHILADELPHIA

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1905

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ANNALS OF SURGERY

VOL. XLI

JANUARY, 1905

No. 1

ORIGINAL MEMOIRS.

AN ADJUSTABLE METALLIC INTERDENTAL SPLINT FOR THE TREATMENT OF FRACTURE OF THE LOWER JAW.¹

WITH REPORT OF CASES IN WHICH IT HAS BEEN APPLIED BY THE AUTHOR.

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THE ideals aimed at in the treatment of fracture of the lower jaw are: 1. To reduce the fracture accurately. 2. To maintain reduction and immobilization of the fragments until firm union is obtained. 3. To provide for the hygiene of the mouth, which suffers constantly from salivary stagnation and putrid decomposition. 4. To meet the preceding indications with the least interference with the oral and maxillary functions (feeding and speech).

To satisfy all these desiderata fully and without some sacrifice of the last two conditions is evidently impossible in *all* cases, and the manner in which these indications can be met will depend upon various circumstances, among which the most important are the extent and situation of the fracture, which are alone sufficient to determine whether the fracture can be successfully treated by *partial* or *total* immobilization of the

¹ Read before the American Surgical Association, June, 1904.

jaw. It is evident that if the functions of the temporomaxillary joint are not interfered with and that the fracture line can be kept at rest during repair, thus permitting the patient to open and shut his mouth at will, that the cleanliness of the mouth and oral functions (feeding and speech) will be maintained with a minimum of discomfort to the patient.

One of the most notable advances in the treatment of fractures is the tendency to diminish, as much as possible, the period of functional disability during the process of repair. The aim of the surgeon is to secure the conditions necessary for perfect osseous union with the least interference with function. This is well exemplified in the ambulant treatment of fractures of the lower extremity, which provides for the conditions necessary to perfect bone union without seriously restricting locomotion. If this is true of fractures of the extremities, how much more important and desirable it must be to preserve the functions of the jaw during the process of repair when this bone is fractured! The serious consequences of the functional disability of the lower jaw, caused by fracture, are manifested, not only by interference with the speech and feeding of the patient, but more particularly by the disastrous effects of salivary putrefaction and oral sepsis, which have given this fracture a special interest to the surgeons of all times. Apart from this, the actual technical difficulties encountered in maintaining the apposition of the broken fragments during repair are, in many cases, very great and account for the vast amount of mechanical ingenuity and thought which has been expended on the subject by succeeding generations of medical men from the days of Hippocrates and Celsus to the present time. That the problems involved are real and have challenged the ingenuity of the best minds of the profession is best told by the bibliography of the subject. A hasty glance at the *Index Catalogue of the Surgeon-General's Library*, including the second series, Vol. viii, 1903, shows references to over 250 articles on fracture of the lower jaw. By consulting these references and other sources of information, we have collected the descriptions of over seventy-five different appliances, devices, and

methods of treating this special fracture. This list, which is very incomplete, is made up largely of the contributions of the surgical writers of the eighteenth and the first half of the nineteenth centuries. The bibliography of this fracture is a monumental repository of the progress of surgery, in which are found, almost in chronological order, the illustrious names in surgery of all the ages. In looking over the list of appliances and references to the methods of treatment which have been employed in the past, we are struck by the fact that almost every one of the mechanical devices and methods of treatment at present in use, and regarded as new by our contemporaries, find their prototypes in ancient publications and have been known and applied, at least in principle, by old and forgotten authors. Apparently the present generation has only succeeded in resurrecting old principles and applying them again in a modernized garb. Real progress has undoubtedly been accomplished by adapting to the fundamentally correct ideas of the older authors the improved technique of dental mechanics and prosthetics, by using better material and appliances for taking impressions of the jaws, thus improving the quality of the interdental splints which are still necessary in some cases; but, apart from this, we fail to find anything essentially new in our modern armament.* To the student of this subject and to the experienced surgeon, it is evident that, notwithstanding the multitude of resources and abundance of appliances, no single method or device will avail for all cases, and that a certain eclecticism and judicious selection of methods must be exercised in order to obtain the best results in individual cases. No one will deny that the most perfect results would be obtained in all cases by the collaboration with the surgeon of a dentist skilled in the methods of oral prosthetics and dental mechanics; but as this is practically impossible in the urgent conditions in

* In further confirmation of this statement, see the erudite monograph by Béranger Feraud (L. J. B.): *Traité de l'immobilisation directe des fragments osseux dans les fractures*; Paris, 1870, and the encyclopædic article by F. Guyon, entitled, "Maxillaire (os) Pathologie," in the *Dictionnaire Dechambre*, Tome 5^{me}, deuxième série, 1872.

which these patients present themselves to the surgeon for treatment, it is proper that the simplest methods available to the general surgeon, with the material at hand, should be utilized, at least, in the first or provisional dressings. Fortunately, a great many of these fractures are simple, and the tendency to the displacement of the fragments is so slight that recovery has been known to take place without any sort of treatment whatever. Boyer reported a case of a water-carrier, who refused to be treated with any restricting bandage, and recovered with very slight deformity, notwithstanding that he used his jaws in chewing, eating, and drinking as usual; and, also, another curious case is reported by A. Bérard, that of a child, whose fractured jaw would not unite until all the immobilizing appliances had been removed, when union quickly took place (Guyon). Of course, these are exceptional cases, which, by their very rarity, emphasize the rule.

In the Charity Hospital of New Orleans, where twelve or thirteen cases are treated annually (in the last twenty months, up to October 1, twenty-five cases of fractured lower jaw were admitted), a large proportion of these patients are treated in the clinics by immobilization with a chin-piece of moulded material and a Barton bandage; fully ten out of twenty-five cases were treated exclusively by this method and apparently with fairly good functional results. In these cases in which the lesions of the mucosa and the soft parts are comparatively insignificant and the tendency to displacement is slight, the patients, who are usually of the laboring class, usually suffer comparatively little pain and stand the privation from solid food with resignation and cheerfulness. In this class of patients the immobilization of the jaw by chin-splint and a sling or head bandage is not absolute, and soon allows of a certain amount of separation of the jaws, which favors the cleansing of the mouth by irrigation with antiseptic solutions and permits comparatively easy alimentation with liquid and soft foods.

On the other hand, there are many cases of single and multiple fracture, in which the tendency to recurrent displacement

after reduction is most obstinate; in these cases the damage to the buccal mucosa is considerable and the tendency to buccal sepsis and submucous infection is great. It is in this class of fractures that the most perfect coaptation is desirable with the greatest freedom of access to the interior of the mouth for purposes of disinfection. These are the patients who have furnished the material for the greatest number of inventions, and, even now, offer problems which tax the originality and resources of the practical surgeon and the dental specialist. Judging by the current literature, they are still fruitful material for discussions in journals and societies.* It is fortunate that the majority of these fractures occur in the mandibular arch, in front of the angles and within the line of the teeth, and that it is possible, in many of these, to immobilize the fragments without interfering with the movements of the temporomaxillary joint.

In fractures of this class, if the teeth are strong and firmly implanted, the broken fragments may be held in place by the old Celsian plan of wiring the adjoining teeth, using them as binding-posts. This method, which has been perfected and modernized by Angle and Löhers, who use clamps and bars to lock the teeth together, is only rarely applicable because the teeth are either loosened by the injury or subsequently mobilized by the strong traction of the jaws and muscles at the line of fracture. To obviate this difficulty, the peridental wire splints of Hammond, Sauer, and Martin (of Lyons), and the fracture clamp of Shotwell have been devised and applied with success by their advocates; but, as they require special skill in their application and they also offer comparatively little resistance to muscular traction, are only applicable in certain favorable cases. Far more accurate and reliable are the moulded dental splints which fit over the crowns of the teeth following the contour of the dental arch; they are made of metal, hard rubber, or vulcanite, cast on moulds of the teeth out of plaster-

* In the *Index Medicus* will be found references to fifteen separate articles on fractured lower jaws which have appeared in journals and society transactions from January to September, 1904.

of-Paris impressions. These dental splints were originally suggested, long ago, by Fouchard, Prestat, Malgaigne, Morel-Lavallée, and have been modernized and perfected by Kingsley, and before him by Gunning, Hayward, Bean, Moore, Lonsdale. Hill, in this country and England; by Martin in France; by Weber, Suersen, Haun, Anton Witzel, and quite recently by Warnekros and Kersting in Germany; but all these, while admirably meeting the conditions in the hands of their inventors, have a disadvantage that they require the assistance of specialists in dental mechanics, whose services are not always available at the time when these cases are brought to the surgeon for treatment; and even when the specialist is available, they often require much time and many trials for their preparation and application. Nevertheless, there are many cases in which splints made from casts are required in order to make them fit accurately over the dental arch. This is particularly true of those cases in which the contour of the dental arch is made very irregular by the loss of several teeth at different points, or in those cases of partial fracture of the jaw in which a large section of the alveolar process is broken, carrying with it a number of teeth which wobble constantly with the fragment of bone to which they are attached.

We purposely exclude from consideration in this connection the comparatively rare fractures of the rami, of the condyloid, and of the coronoid processes in which no interdental immobilizing appliances, as a rule, are applicable, and in which the suppression of all jaw motion is absolutely mandatory as an essential to repair. Neither shall we consider those extreme cases of multiple comminuted fractures of the jaw which result from gunshot and railroad injuries and other forms of violence in which the number and mobility of the osseous fragments, together with the enormous damage done to the soft parts, precludes all possibility of using any device which requires some fixed point of support for its successful application. In such instances, the question of immobilization and osseous repair is secondary to the more vital and pressing demands of drainage and asepsis; the correction of deformity

and impairment of function being relegated to a secondary plane in meeting graver complications.

Therefore, if we leave out of consideration the two extreme groups of jaw fractures, *i.e.*, the very simple, with little tendency to displacement, on the one hand; and the very serious, compound, multiple, and complicated cases, on the other, in which no sort of restraining appliance is available to prevent deformity, etc., there is still the middle class, previously referred to, which it would appear desirable and advantageous to treat by some ready method that would satisfactorily meet the requirements of asepsis and repair with the least discomfort to the patient.

The presence of a considerable number of these troublesome fractures in a large hospital service has, for many years, impressed me with this need. I have felt the want of an appliance which could be adapted to the conditions which we find in a great number, if not the majority, of these patients, and which could be readily and successfully adjusted by any medical man with ordinary surgical training without the need of calling upon a specialist in dental or oral mechanics for its application.

While the idea of a universal splint for fractures of the lower jaw that will fit all patients is, of course, absurd, it is not unreasonable to hope that a comparatively simple contrivance can be devised which will be serviceable in a large number of the more common types of this injury, as they present themselves in our clinics. Reasoning from the data of experience, which show that this fracture occurs chiefly in men (90 per cent.); that it occurs in the adult (dentulous) period of life, from the twentieth to the fiftieth year (in the last twenty-five cases of this fracture attended in the emergency service of the Charity Hospital of New Orleans, the average age of the patient was twenty-three years); and that fully 90 per cent. of these fractures occur in some part of the anterior or projecting segment of the maxilla in front of and including the angles, it is not a vain hope that by a proper selection of material a splint

may be devised which will permit of adaptation to a large number of these patients.

That the same need has been felt by others is very apparent in the writings of the older surgeons of the past century. Bush (1822), Houzelot (1826), Joussett (1833), Malgaigne (1847), Morel-Lavallée (second appliance, 1853), Rüttnick, Kluge, and others too numerous to mention, all thought of appliances which acted more or less on the same principle, *i.e.*, that of a clamp which held the broken fragments of the jaw in the grip of a plate fitted over the teeth, and an extra-buccal piece, which was adjusted over the chin. A great variety of models were thus designed, made of various materials; some of them very ingenious and no doubt useful in the special cases in which they were applied; but they all appear to have failed in some essential, which was necessary for general utility, as is shown by the fact that they have never retained a permanent place in the armamentarium. The chief defects that can now be recognized in these older splints is in the use of material in the dental plates which lacked adaptability to the numerous variations and conditions of the dental arch which are met in fractures.

In later days this objection has been overcome, as far as individual cases are concerned, by the use of moulded hard rubber or metallic splints, which are moulded or cast over plaster impressions of the dental arch of the particular patient for whom they are intended. These dental splints may be quite sufficient in themselves, as stated previously in this communication, to hold the broken fragments in position, or they are attached to outside bars or braces, which project from the mouth and hold the dental plate firmly to an adjustable chin-piece. In this way the primitive and crude models of Rüttnick, Morel-Lavallée, and others have been modernized through the efforts of the dentists of the present day, notably by Kingsley and a host of others in this country; by Martin, of Lyons; by Lohman and A. Witzel, and others in Germany. The objection to these, however, from the point of view of the surgeon who has to deal most often with these fractures in large surgi-

cal clinics, is that they fail to meet the requirements of emergency and charity practice. These patients, as a rule, apply first to the general surgeon, whose duty it is to meet the indications as thoroughly as possible. If the patient is to be transferred to the care of a dental specialist, days must pass before a perfectly fitting splint can be attached; in the meantime, if the displacement is not properly corrected, the patient suffers great hardship.

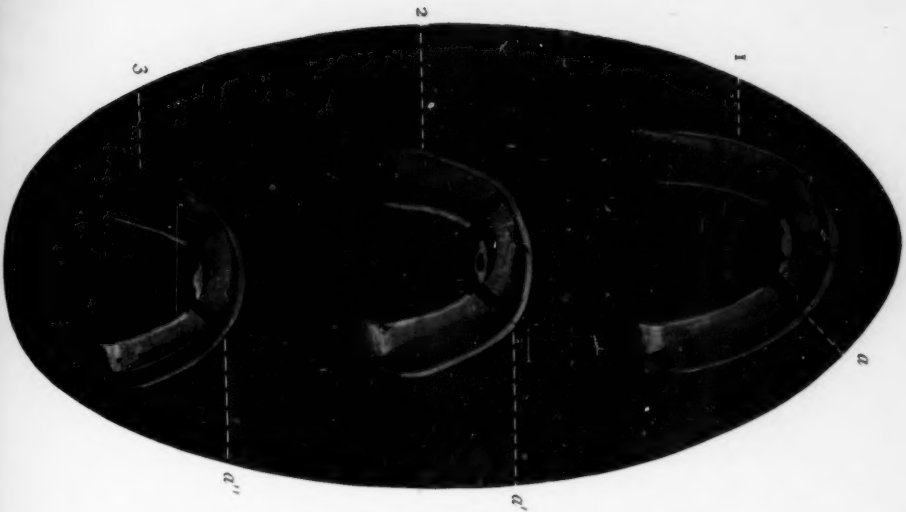
As far back as 1897 I had occasion to exhibit to the Orleans Parish Medical Society (*vide Transactions* of this society for 1897) a modification of a metallic splint, devised with the objects previously stated in view, by Dr. Robert C. Ackland, of St. Bartholomew's Hospital, London, and described by him in the *British Medical Journal* of April 1, 1893. At that time the splint appeared to meet the conditions of the average adult case of fracture of the jaw, theoretically, quite well; but, with increasing experience, I had to abandon it, because the dental mouth-piece, which fits over the arch of the teeth, was not flexible enough to permit its adjustment to the numerous variations of the arch that are met in practice; neither was the chin-plate adjustable to the various degrees of prognathism; moreover, the projecting twin bars which connect the dental plate with the chin-piece not only interfered with the sphincter functions of the mouth, permitting the escape of fluids and dribbling of saliva, but they caused deep ulceration at the angles of the mouth and so much distress to the patient that it had to be abandoned. For a while we tried other methods and also resorted to the suture of fragments in the multiple, compound, and more difficult cases, but the results have not justified the general adoption of this method, except in a few selected cases. The admission last winter of a number of fractures of the lower jaw in our clinics, in which the tendency to displacement was very marked, led us again to experiment with a new metallic splint. While this splint is not in the least new in principle, it is original in its construction and in the combination of different suggestions from various sources which we have found of value in

overcoming the practical difficulties which we have encountered.

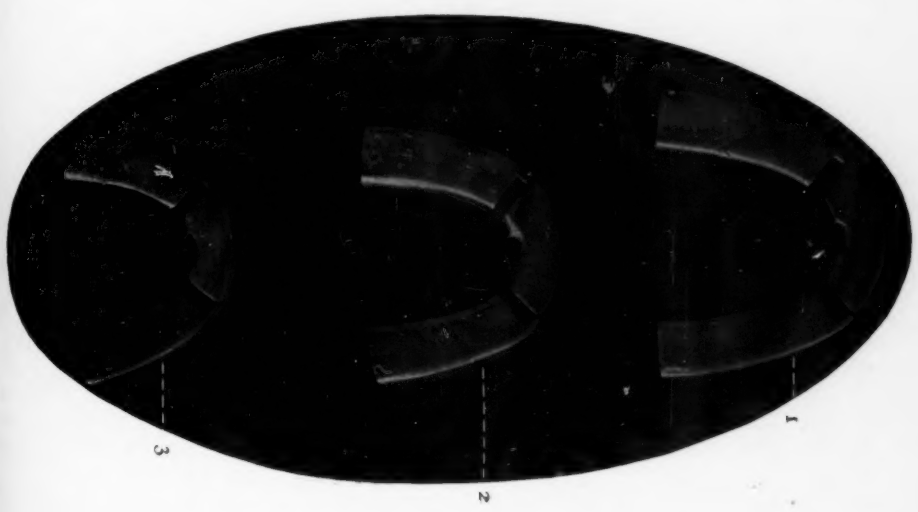
[The description that follows applies to the latest improved model, which we have tried only in one case. The first five cases reported at the end of this paper were treated with the first two models in which the dental piece or gutter was permanently fixed to the clamp and was not provided with the Wiley cuts, which make the present dental splints so much easier of adjustment to different jaws.]

The splint is constructed on the principle of a clamp, which holds the entire projecting arch of the jaw (from the chin to the angles) firmly in the grip of a flexible mouth-piece, which fits like a gutter over the entire dental arch; and, of an external plate or chin-cup, which extends from the symphysis to the angle. The mouth-piece and chin-plate are both detachable; the chin-cup is made adjustable to various degrees of prognathism by a sliding joint fixed by a pin and thumb-screw. The appliance, therefore, consists of three component parts, the details of which are as follows:

1. The *mouth-piece* or *dental splint proper*. This is horse-shoe in shape, and in the latest model is made after the pattern of the impression trays used by dentists to take casts of the lower dental arch. It is hollowed in three planes to fit loosely over the crowns of the teeth, the groove or gutter broadening from before backward to correspond with the increasing diameters of the molars. The edges of the splint form two flanges or rims which project downward; the outer flange extending to the neck of the teeth on the outer or buccal side; the inner flange or rim dipping to a lower level almost touching the gums on the inner or lingual side. This dental piece is made of block tin and is indented approximately on a level with the bicuspid by two deep cuts which penetrate the gutter to its outer rim, leaving a narrow wedge-like space, which is closed at the apex by the outer or labial rim of the splint. These cuts were originally suggested by Dr. J. K. Wiley to increase the flexibility of the dental impression trays in making impressions of the



FIGS. 1 and 2.—Superior and inferior views of three detachable and interchangeable mouth-pieces, or dental plates, which are supplied with each splint. No. 1, *large size*, for adults; No. 2, *medium size*, for youths; No. 3, *small size*, for children. In addition to the softness of the metal used (block tin), which allows each mouth-piece to be adjusted to the contour of the jaw and teeth, the adjustment and adaptation of these splints to individual cases are further obtained by cutting partial sections (*a a'* *a''*) in each mouth-piece, as suggested by Dr. G. K. Wiley, in the manufacture of the adjustable impression trays used in dental practice. The hollow groove in each mouth-piece (Fig. 2) can be filled with the soft moulding compound, or dental wax, used in dental practice. In this way loose teeth are held in place, the mobility of the splint is reduced to a minimum, and the difficulty of obtaining a uniform compression caused by the vertical irregularities of the teeth is overcome.



lower jaw. The softness and flexibility of the metal of which the splint is made, together with the Wiley cuts, allow the operator to adjust the splint to the varying contour of the lower dental arch as it is met in different individuals.

After studying the dental arches and maxillary contour of fifty different persons of both sexes and various ages, from the fifth to the sixtieth year, I had the splint made in three different sizes: the smallest for children, the medium size for youths and young women, and the largest size for full-grown adults. From these different sizes a selection can be made to fit the jaw of almost any normal individual who is likely to suffer from this injury.

In addition to the ease with which the splint can be moulded to the outline of the dental arch, the breadth of the gutter can be increased and otherwise altered by stretching the flanges and modelling them with a pair of ordinary hand-pincers. The dental gutter is also provided with a deep groove or slot in the centre of its inner or labial surface, which fits the hook at the tip of the clamp and holds it very firmly in position when it is locked. By this arrangement the splint is easily attached to the clamp after it has been adjusted to the jaw.

2. The *chin-piece* is made of perforated aluminum and is shaped to fit the contour of the jaw. It can be moved backward and forward on a sliding joint, which is adjusted by a thumb-screw and is attached to the lower limb of the clamp. In order to prevent injurious pressure on the skin of the chin, it is padded with cotton wadding, covered with a layer of gauze, smeared with oxide of zinc ointment.

3. The *clamp* which holds the mouth and chin-pieces together is made of soft steel and consists of an upper and lower limb screwed together at a considerable distance in front of the mouth. The upper limb projects from the middle of the mouth and is curved over the lower lip so as to allow the mouth to be closed, a very necessary provision to prevent salivary dribbling and to permit a complete control of the mouth in drinking and eating. The pressure required to hold the jaw firmly in the grasp of the intra- and extra-buccal pieces is obtained by

a screw attached by a swivel-joint to the upper limb of the clamp, the pressure being regulated by a thumb-screw, which acts on the lower limb of the appliance. (Fig. 3.)

Application of the Splint.—The chief object of this splint is to immobilize the broken fragments of the jaw without restricting its movements as a whole, thus permitting the mouth to be opened and closed at will. It is especially intended for compound fractures of the maxillary arch (symphysis and body), whether single or multiple, in which there is a marked tendency to recurrent displacement and that require frequent inspection and antiseptic irrigation of the oral cavity. It is obvious that in fractures involving the angles and rami of the jaw or the condyloid and coronoid processes, or in the graver cases of gunshot and other injuries in which there is great comminution of the jaws with laceration of the soft parts, that total immobilization of the maxilla is necessary and that the splint as a clamp cannot be used. In some of the cases the dental gutter or mouth-piece may be applied with a chin bandage after the reduction of the fracture. This part of the appliance is then used solely as an interdental splint and as an adjunct to the moulded chin-splint used in such cases and held in place with liquid glass, starch, or plaster-of-Paris bandage. The best chin-splint in such cases is a piece of porous blanket or coarse flannel, thoroughly soaked in plaster cream. This is readily moulded to the contour of the chin and jaw and allowed to dry *in situ*, any excess of the cloth being trimmed off while the plaster is setting. It is understood that the skin must be thoroughly shaved and lubricated with vaseline before applying the plaster.

If we take, as an example, a typical case in which the jaw is broken obliquely through the body, the first step is to shave the skin and disinfect it in the usual manner. If there are wounds which require suture, they should be closed, preferably with aseptic zinc oxide adhesive plaster strips, which secure the closest coaptation without the risk of stitch abscesses. A general anæsthetic may or may not be required, according to the peculiarities of the case. The mouth should be thoroughly dis-



FIG. 3.—Author's adjustable metallic splint for fracture of the lower jaw (latest model). The splint consists of the following detachable parts: (a) a mouth-piece of soft metal (block tin); (b) a clamp adjusted and tightened with a screw; (c) a chin-plate (of perforated aluminum), which can be moved backward or forward by sliding on the lower limb of the clamp. This is fixed and held in place by a thumb-screw.



FIG. 4.—Lateral view of the splint *in situ* as shown on adult skull.



FIG 5.—Front view.



FIG. 6.—Interior view, showing the adaptation of the hollow dental plate to the contour of the teeth on their lingual aspect. All these illustrations show the clamp-like action by which the splint holds the maxilla, and its mode of action in all fractures of the symphysis and body as far back as the angle of the jaw.



FIG. 7.—A. S., lower jaw fractured by falling on a tree while alighting from a car in motion. Double compound fracture. One line of fracture dividing the body of the jaw obliquely at angle on the right side; the other broke the body of bone between the left lateral incisor and canine. Reduction and permanent apposition impossible until the splint was applied. Excellent and functional and anatomical results after wearing the splint for twenty-one days.



FIG. 8.—J. H., compound fracture of lower jaw, caused by fist blow. Line of fracture oblique, bisecting lower jaw at angle and terminating above behind last molar tooth. Great displacement and mobility of fragments. Reduction and apposition only obtained by splint. Barton bandage used to immobilize jaws with the splint. Splint worn eighteen days, and followed by excellent results.



FIG. 9.—E. B., struck on the jaw with a club; compound fracture. Lower jaw broken completely between left external incisor and canine. Splint worn twenty-eight days without inconvenience and with perfect results.



FIG. 10.—Miss N. F., lower jaw broken by fist blow. Oblique simple fracture of body on level with second molar; submucous break, with lateral displacement of left bicuspid and large fragment of alveolus. Perfect result after wearing splint seventeen days.

infected as carefully as possible by copious irrigation with a hot lysol solution (1 per cent.). After reducing the fracture, the contour of the dental arch should be restored, and while the bone is held in place by combined external and internal manipulation, one of the metallic dental gutters is selected, according to the age of the patient and size of the jaw, and fitted on the arch of the teeth. Usually the splint requires some moulding with the fingers before a fairly accurate fit can be obtained. If the splint fits well, it will usually hold the fragments in apposition by pressing it firmly against the teeth while making downward and forward traction towards the chin. In many cases in which the teeth are loose or missing in places, it will be necessary to fill the gutter of the tray with a modelling composition or wax used by dentists in making impressions of the teeth. I have found the "Excel" and S. S. White modelling compounds, sold in all dental dépôts, especially useful for this purpose; they are quickly softened by dipping in hot water and can be spread very easily over the inner surface of the tray. While the modelling compound is still soft in the gutter splint, this is applied to the dental arch and allowed to remain *in situ* until it becomes hard by cooling. In this way the loose teeth are held in position, the gaps between them are filled up, and the splint is fixed in place. The outside clamp is now adjusted. Special care must be observed in protecting the skin of the chin, which is frequently contused and liable to inflammatory œdema. This is best done by thoroughly padding the chin-plate with cotton wadding and gauze, smoothed over with zinc ointment. After the chin-plate is adjusted, the clamp is tightened with a screw with sufficient firmness to hold the mouth-piece in place. The patient is taught how to irrigate his mouth with a fountain syringe, the irrigations to be thorough and frequent; every hour or two during the day is not too often. In cases in which there is marked contusion of the soft parts and tendency to swelling, it is necessary to relax the tension of the screw at frequent intervals to prevent blistering and pressure necrosis of the skin of the chin. In these cases it is necessary to im-

mobilize the jaws during the first few days until the swelling has subsided, using for this purpose a Barton, Gibson, or a sling bandage, which will reinforce the splint and keep it in position while the tension of the clamp is relaxed. After the swelling has subsided, the outside bandages are removed and the splint alone is used, allowing the patient to open his mouth freely for all purposes. Even then, however, it is important that the tension of the clamp be relaxed at various intervals, according to the tolerance of the patient. So necessary it is to protect the skin of the chin from the effects of undue pressure.*

CLINICAL REPORTS OF CASES TO ILLUSTRATE THE USE
OF AUTHOR'S SPLINT.†

CASE I.—*Double Compound Fracture; One through the Left Body, the Other through the Right Angle of the Lower Jaw.*—A. S., a German lad, aged eighteen years. On December 19, 1903, while under the influence of whiskey, he attempted to alight from a moving street-car and was struck full in the face by a small tree. An ambulance was at once called for and he was carried to the hospital, reaching there about 6 P.M. He was unconscious when first seen by the ambulance surgeons, but soon recovered. His whole face was horribly contused, looking like a mass of jelly, but the only bone injury was a double compound fracture of the lower maxilla; one being an oblique fracture through the angle on the right, the other through the body, between the lateral incisor and the canine tooth on the left. There was no great deformity at the interdental fracture, the right

* In closing this paper, I desire to thank my assistants and friends, Dr. H. H. Rightor (now of Helena, Ark.), to whom I am especially indebted for valuable suggestions and diligent observations in the first five cases in which the splint was used. To Dr. U. Maes for valuable assistance in making the last model; and to Mr. W. E. Sistrunk, resident interne, Charity Hospital, for clinical observations and statistical data. Also to the McDermott Surgical Instrument Company of this city, who now manufacture the splint and supply it to the trade, for their valuable co-operation.

† The first four observations are abstracted from the original histories written by Dr. H. H. Rightor (Tulane Class, 1904), who embodied them in his graduation thesis, entitled, "A New Splint for Fracture of the Lower Jaw, with Reports of Cases."

fragment being slightly anterior to the left; at the angle, however, the anterior fragment was displaced under the posterior for one-half inch. A cardboard chin-piece was moulded to the jaw and Barton's bandage was applied over it. This in nowise approximated the ends of the bone and seemed to increase the pain. He suffered intensely all night, requiring morphine hypodermically. The following morning the bandages were removed and the mouth thoroughly irrigated. The splint designed by Dr. Matas was applied. After reducing the fracture it held the bones in perfect apposition. Though the angular fracture was behind the line of the teeth, the patient was able to use his jaws without discomfort. Nevertheless, since his two upper central incisors were missing and there would be no difficulty in feeding him, it was deemed more prudent to apply a bandage in order to immobilize the jaws. In attempting to nourish him by means of a rubber tube with a funnel attached, it was found that the upper bar of the clamp pressed on the lower lip, preventing the perfect closure of the mouth, thereby rendering sucking impossible and allowing dribbling of saliva. Another splint was made with an upward curve over the lower lip, which permitted the mouth to close perfectly. (Fig. 7.) The after-treatment was simplicity itself. The patient irrigated his own mouth every two hours with a gallon of 0.5 per cent. lysol solution, keeping it sweet and clean. The diet was limited to liquids for a few days, and then, when the outside bandage was removed, a more liberal dietary was allowed. Every fourth day the clamp was loosened and the chin was wiped with alcohol. His recovery was uneventful. On the twenty-first day the splint was taken off and the result found to be perfect. There was no deformity and the teeth articulated well. The lower set was somewhat blackened from the long contact with the metal, but a few brushings with a tooth-powder was all that was needed to restore the original color and polish.

CASE II.—*Single Compound Oblique Fracture involving Angle of the Jaw.*—J. H., muscular white man, aged twenty years. On Monday, January 9, 1904, he became intoxicated, and when on his way home got into an altercation with two grown negro men. They finally came to blows, and one of them landed square on his left jaw with his bare fist. The blow knocked the patient down; he was unconscious for a short time, during which his opponents fled. He soon recovered and walked to a

neighboring drug store, suffering no great pain, except when attempting to speak. The deformity was so marked that a diagnosis of fracture of the jaw was made on inspection. The examination showed that the line of the fracture was an oblique one, bisecting the angle of the jaw; the anterior fragment was displaced behind and below the ramus. It was impossible for him to close his mouth; crepitus abnormal mobility, etc., in fact, all the classical signs of fracture were present. Digital examination of the mouth showed that the line of fracture terminated just behind the last molar tooth on the left side. The mucous membrane was torn for over an inch. The assistant house surgeon, who attended him, met with no difficulty in accurately reducing the fracture, but found that it was impossible to maintain reduction by the usual routine method. The last splint devised by Dr. Matas and used on the preceding case was readily introduced, and over this a modified Barton's bandage applied. There was now no tendency to recurrence; the pain was immediately relieved, and he never suffered after. The subsequent treatment was the same as in Case I. This patient had also a missing tooth, and through this space he was nourished and the oral cavity irrigated. The splint was removed on the eighteenth day, and, with the exception of a small amount of callus on the outer surface of the bone, no trace of injury remained.

CASE III.—*Compound Fracture of the Body of the Jaw between Canine and Incisor Teeth.*—E. B., white male, aged twenty-three years. On January 13, 1904, while he and a crowd of companions were drinking, he got into a fight with his brother-in-law. According to the patient's story, he had the best of it, his opponent being on the ground and he on top of him. While they were in this position, a brother of the opponent struck the patient full across the right face with a club, "knocking him senseless." He remained unconscious during the night, bleeding from the jaw all the time. The following day he was taken to the station and brought by train to New Orleans, thence to the Charity Hospital, arriving there twenty-six hours after the injury. He was very weak and pale from loss of blood. It was determined that he had a fracture of the lower jaw, compound externally and internally; the line of the fracture being between the left lateral incisor and the canine tooth, extending the whole depth of the jaw. There was a tendency to displacement on motion.

The mouth was thoroughly irrigated, the face shaved, the external wound dressed. The splint first used on Case I was applied, as the improved one was still in the mouth of Case II. Fortunately, the man had extra long teeth, and the curve on the upper limb of the clamp was not necessary, and he was able to close his lips perfectly. (Fig. 9.) No bandages were necessary in this case, excepting a small piece of adhesive plaster to hold the dressings on the external wounds. He was able to open and close his mouth from this on without pain. Irrigation was practised, as in the other case. In a few days the mucous membrane had healed, and he was allowed soft foods. Mastication caused no disturbance of the fragments. About the time that the splint should have been permanently removed—the eighteenth day—the interne assigned to the service was taken sick, and, as the patient was loitering around, caring for himself, he was in some way overlooked, and allowed to use the splint twenty-eight days. At the end of that time it was removed. The union was firm and without appreciable callus. There was, however, a pressure ulcer, the size of a twenty-five-cent piece, under the symphysis due to insufficient padding of the chin-piece and neglect of the skin. This healed readily under treatment.

CASE IV.—*Compound Double Fracture, involving the Body of the Lower Jaw, between the Centre and Lateral Incisor and through the Body obliquely into the Angle on the Same Side, complicated with Fracture of the Right Upper Jaw opening into the Antrum; also fractured Zygoma and Contusion of the Brain.*—No history could be obtained of this case, except that the patient, who was a colored man, aged twenty-three years, had been the victim of a railroad accident. He was admitted on March 12, 1904, four days after the injury. When admitted he was delirious and in a profound septic condition. The features were unrecognizable on account of the great swelling, and the mouth emitted a horribly foul and unbearable odor. After recognizing the fractures of the jaw (lower), the splint used in Case II was applied, and held the ends of the bones in perfect apposition. As there was no tendency for displacement, no bandages were applied. Copious irrigations were practised hourly to disinfect the mouth, which could be opened with comparative ease, on account of the fixation obtained by the splint. In this way the

local condition of the mouth was very much improved. The patient died on the fourth day after admission from the effects of the contusion and sepsis. The autopsy confirmed the clinical diagnosis. This case is quoted simply to show that the fractured jaw was well controlled by the splint and permitted free and copious irrigation of the mouth while the fragments were held in apposition.

CASE V.—*Alveolar Fracture involving the Bicuspid Teeth on the Left; complete Fracture through the Body obliquely to the Angle on the Right.*—Miss N. F., aged twenty years, on June 28, 1904, was assaulted by an unknown negro who struck her a terrific blow on the face with his fist. She was stunned without becoming wholly unconscious. She was taken to the hospital in a cab, where an attempt was made to fit on one of the splints used by Dr. Matas. This was one of the early models, consisting of a single mouth-piece, which was permanently attached to the clamp. This was found too long to fit, and a simple bandage, with a chin-splint, was substituted for it. On the second day after the injury she applied directly to Dr. Matas for treatment at his private office, where a model of the splint similar to the one used in the hospital was adjusted to her dental arch, but not until the interdental piece or gutter had been shortened. After this alteration the splint fitted perfectly, and the fragments were held in perfect apposition. (Fig. 10.) She was taught how to irrigate her mouth, and wore the splint constantly without any other bandage or restriction to the movements of the jaw. The splint was removed seventeen days after it had been applied, when it was found that the union was sufficiently firm to dispense with the appliance. There was no deformity or appreciable irregularity in the line of the teeth. The splint was removed every day for a week, and then every second day, to change the padding under the chin and to wash the skin with alcohol. The ease with which this patient could speak, eat, and drink with the splint on was remarkable.

CASE VI.—(Reported by Mr. Sistrunk, interne, Charity Hospital.)—R. A. T., male, aged twenty-five years. May 22, 1904, while boxing with a friend (both using boxing-gloves), was struck on the right side of the lower jaw. He suffered excruciating pains and could scarcely talk. He came at once to the hospital, where he was found to have a *compound transverse*

fracture of the right half of the lower jaw, midway between the symphysis and the angle. The teeth upon the side nearest the angle of the jaw were raised above the others, and the broken ends of the bone could be seen protruding through the lacerated wound in the gum. After reducing the fracture, the splint devised by Dr. Matas was applied and held the fragments in perfect apposition. The splint gave him almost instant relief, and after its application the patient could easily talk and swallow without much pain. He returned the next day, and the splint was removed and the mouth irrigated with a 1 per cent. solution of carbolic acid. The removal of the splint was followed by considerable pain, and the patient begged to have the splint replaced. This was repeated every day for ten successive days, when it was found that the bones remained in position without the splint. By this time an ulcer had developed under the tongue, which was attributed to pressure. In consequence of this ulcer and the fact that the bones had united sufficiently to prevent displacement, the splint was removed. The patient was discharged on June 3, at his own request, with a Barton bandage put on to hold the dressings under the chin and as a protection against displacement of the fracture. When he was discharged, no motion or crepitus could be obtained and the teeth were on a level.

SOME CONSIDERATIONS REGARDING WOUNDS OF THE LIVER.¹

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MUCH attention of late years has been devoted to the general consideration of open and subcutaneous injuries of the abdominal viscera, and at the present time the diagnosis, indications for operation, and the operative treatment itself of these injuries are questions that have been fairly well solved, and with regard to which reasonably definite conclusions have been reached.

The determination of the existence of some visceral injury has now become possible in most cases by our present methods of examining the abdomen and noting the changes here as well as the alterations in temperature and pulse. The rule to operate for these injuries within the abdomen has become so definite that we are often inclined to make merely the general diagnosis of a wounded viscus, and then proceed at once to laparotomy without a more definite determination of the particular structure involved. It is the object of this paper to consider the injuries of one particular organ, the liver, and to discuss their special signs, prognosis, and indications for treatment.

Etiology.—The liver is injured with greater frequency than any other solid abdominal viscus. Among 365 cases of subcutaneous injuries of solid viscera, the liver was the seat of injury in 189, and the spleen, kidney, and pancreas combined in 176. There are several factors which make it particularly susceptible to injury, especially in contusions of the abdomen. It lies wedged in between the ribs and vertebral column, is very heavy, very inelastic, and only slightly movable. It is nine times as heavy as the spleen and ten times as heavy as the

¹ Read before the New York Surgical Society, November 9, 1904.

kidney. Other predisposing factors are added from physiological and pathological causes. Digestion makes it larger and more vascular. Alcoholism, tuberculosis, malarial conditions, and tumor formation render it more friable and exposed to injury. In the presence of any one of these conditions a very slight traumatism may suffice to produce a subcutaneous rupture of the organ with fatal outcome. Chiari reports a case of rupture of a carcinomatous liver simply from turning over in bed. Heinzelman that of the sudden death of a patient from rupture of the liver who two weeks before had had pneumonia followed by pleurisy. In the following case, which recently came under my own observation, the etiology of the injury to the liver was very obscure:

CASE I.—A man, twenty-seven years of age, was admitted to the prison ward at Bellevue Hospital, September 20 of this year, suffering from what was thought to be alcoholic delirium. A history was later obtained from his family that he had been ill for three weeks. There was no history or mark of traumatism. On admission his temperature was 100.2° F.; pulse, 120, and respirations, 26. The leucocyte count was 15,000. He was markedly alcoholic in appearance and very delirious. The abdomen was somewhat distended, and there were well-marked rigidity and tenderness on the right side over and below the ribs. The liver extended from the sixth rib above to three inches below the free border. The spleen was not enlarged. A diagnosis was made of probable abscess of the liver.

While operative interference offered but little hope of a favorable outcome on account of the poor condition of the patient, it was decided upon as the only chance for his recovery. An incision was made through the right rectus, exposing a very large, congested, and friable liver. There was an escape of some thin, bloody fluid from the peritoneal cavity, but there was no peritonitis. On inspecting the convex surface of the liver, which was somewhat adherent, a large tear was discovered on the right lobe about six inches in length. The edges for a distance of three inches on either side were necrotic, and loose sloughs of liver tissue could be removed with the fingers. The injured portion of the liver was about to break down and form a superficial

abscess. Some of the necrotic tissue was removed, the resulting defect packed with gauze, and the abdomen partially closed. The patient's condition did not improve, the delirium continued, and he died on the third day with a temperature of 103° F.

This seems to have been a case of subcutaneous rupture of the liver in a very alcoholic subject without any history of injury. Some injury undoubtedly occurred, but it was apparently not severe enough to produce signs over the liver region or lesions of other parts of the body. Traumatism was never thought of in making the diagnosis before operation.

The two varieties of wounds of the liver, viz., the subcutaneous and the open, are, according to Edler's statistics, about evenly divided. Of the open injuries, gunshot wounds were nearly twice as common as stab wounds. These figures will, of course, vary in different countries and localities. The ribs, however, offer more protection from stab wounds than from those produced by a bullet. Subcutaneous injuries are very common in children, especially in the large cities, where they are exposed to run-over accidents and falls from high tenement houses, fire-escapes, etc.

As far as the portion of the liver involved is concerned, we find that in subcutaneous injuries the right lobe is injured about six times as frequently as the left, and the convex surface about twice as often as the concave. In stab wounds, on the other hand, the left lobe is the more frequently injured, owing to the fact that it is less protected by the ribs than the right.

Wounds of the liver are very frequently associated with injuries of other organs. Probably no organ has as many complicating injuries. In subcutaneous rupture very common associated injuries are those of the lung, spleen, kidney, gastrointestinal tract, and bile ducts. Injuries of distant parts, such as fractures of the skull, spine, and extremities, often accompany ruptures of the liver. In this case the latter are frequently due to violence by contra-coup. Thus, a man falling from a height upon the head or feet fractures the skull or extremities, and the liver by indirect violence is torn from its attachments or forcibly pressed against the contracted dia-

phragm. Among 151 cases of subcutaneous rupture collected by Hinzelman, one-third were produced by indirect violence.

Gunshot wounds and stab wounds are found associated many times with perforation of the diaphragm, lung, stomach, or intestines, and kidney. The presence of these complicating injuries increases very materially the gravity of the prognosis and renders our operative interference much less hopeful.

The following case of gunshot wound of the liver had a rather unusual feature:

CASE II.—A man, twenty-five years of age, was admitted to Bellevue Hospital in August, 1900, with a history of having been shot in the abdomen by a pistol of .32 caliber. The wound of entrance was to the right of the median line near the free border of the ribs. There was no exit opening. There was some shock, but no signs of internal hæmorrhage. Laparotomy showed two openings in the liver, one on the convexity, the other on the under surface. These wounds had caused only slight hæmorrhage. No other wounds were found, although the intestines and stomach were carefully examined. The wounds in the liver were covered by strips of gauze, which were brought out through the abdominal incision. During the convalescence the dressings were stained with bile for several days. Six weeks after the injury the patient complained of pain about the rectum, and examination showed a small ischiorectal abscess. This was incised, and inside of it was the .32-caliber bullet. In all probability, the bullet entered the intestine either at the time or by ulceration, and then remained in the rectum, where it ulcerated through the mucous membrane, causing the abscess. Otherwise the recovery was uneventful.

Symptoms.—In determining the existence of a wound of the liver, we have usually a number of factors of more or less diagnostic aid. In subcutaneous wounds there may be signs of local injury of the overlying parts. Ecchymosis of the skin or fractures of ribs may turn our attention towards the liver as the injured organ. In gunshot wounds there will be a wound of entrance usually over the liver, and if there is a

wound of exit, the direction taken by the bullet may determine whether the liver has been perforated. Escape of venous blood with or without an admixture of bile are important positive signs, particularly in stab wounds. Localized pain over the liver which is intensified by pressure or percussion is usually present. Pain radiating to the right shoulder is suggestive of injury of the liver, and has been noted in a number of cases. The pain in the liver region is intensified by respiration, and hence the right chest does not move as freely as the left. In consequence, a false diagnosis may be made of intrathoracic injury. Terrier reports such a case in which a thoracotomy was done, and the autopsy showed the injury to be a rupture of the liver, with a large accumulation of blood in the abdomen.

Hæmorrhage being an important and constant accompaniment of wounds of the liver, symptoms of the same, both local and general, are usually present. In severe injuries, especially subcutaneous ruptures, the general signs of hæmorrhage are well marked, but are not always easy to differentiate from the symptoms of severe shock that accompany these injuries. The accumulation of blood in the abdomen can frequently be demonstrated by percussion. Rigidity of the abdominal muscles may, however, render this a difficult task. The blood gravitates into the right iliac fossa and may give well-marked dullness. The *diffusion* of blood causes, furthermore, gradually increasing pain from pressure, and this is often a characteristic sign of rupture of a vascular organ. Disappearance of liver-dullness due to beginning tympanites may come on in a few hours, and should not lead to a false diagnosis of a ruptured hollow viscus. When due to escape of gas from a ruptured intestine, this disappearance of the liver-dullness comes on immediately after the injury. Later on the area of liver-dullness is *increased* from a resulting hepatitis.

Jaundice is occasionally present after injuries of the liver, but usually does not appear until the second to the fourth day. It is caused by absorption of bile from the peritoneum. Ludwig found it twenty-four times in 267 cases. It is very frequent after injuries of the bile passages. In case of subsequent

inflammation or abscess formation in the liver, a secondary jaundice may occur days or weeks afterwards.

The escape of blood and bile into the peritoneal cavity may result either in an acute septic peritonitis or a chronic plastic peritonitis with adhesions. The blood coming from the portal circulation varies in its infectious character. This depends somewhat upon the condition of the gastro-intestinal tract at the time of injury. The same is true of the bile; that from the common duct is more dangerous than that from the liver itself. The onset of this acute peritonitis may be very gradual. Open injuries may, of course, cause direct infection from the outside or by means of a foreign body.

The signs which accompany any visceral injury are usually well marked in case of injuries of the liver. The rigidity of the abdominal muscles is a never-failing symptom. It may be confined to the region over the liver. Vomiting and hiccough are not uncommon, and are due to the peritoneal irritation. A rise of temperature usually takes place from absorption of blood from the peritoneum. The rise of temperature due to peritonitis occurs at a later period, usually the second to the third day.

Prognosis.—The prognosis of injuries of the liver depends largely upon the associated injuries and the complications. The severest cases die within twenty-four hours from shock or hæmorrhage. These cases are hopeless from the start, and there are frequently injuries of other organs. The promptest operative interference will not be able to lessen the mortality of these severe cases. Of 162 fatal cases collected by Edler, hæmorrhage was the direct cause of death in sixty-nine. Generally speaking, the prognosis of injuries of the liver alone is much better in the gunshot and stab wounds than in the subcutaneous ruptures. The hæmorrhage in the former is less severe and the shock less marked. Apart from hæmorrhage and shock, the complications due to infection influence the prognosis very materially. Acute peritonitis and abscess of the liver are responsible for many deaths. Even in subcutaneous injuries, accidental infectiousness of the bile

or of the blood from the portal system may cause suppurative peritonitis. Furthermore, the contused wound of the liver may offer a favorable location for the development of an abscess, particularly if the blood circulating in the liver is infected or the resistance of the tissues is much lowered. A long period may elapse before the fatal outcome. Even a plastic peritonitis may cause a fatal result from obstruction of the intestine by adhesions.

There are many mild cases of laceration of the liver which go on to recovery without complications and with very few symptoms. The number of these cases is, I think, larger than is generally supposed. They often go unrecognized, and the person recovers with a diagnosis of severe contusion of the abdomen without visceral injury. The present tendency to make an exploratory laparotomy in severe contusions of the abdomen which show signs of muscular rigidity and which are suspected of being complicated by a visceral rupture occasionally brings to view a mild laceration of the liver, especially of the convex surface, with very moderate hæmorrhage. Such cases have an excellent prognosis, and recovery will usually result whether they are operated upon or not. If these mild cases in which there are one or more superficial ruptures were included in the statistics, the mortality percentage would be a great deal lower than it is at present.

In 1887, Edler's statistics showed a mortality in subcutaneous ruptures of 78.1 per cent.; gunshot wounds, 39.0 per cent.; stab wounds, 37.5 per cent. This mortality, particularly of subcutaneous injuries (78.1 per cent.), seems much higher than at the present time, and this, if true, is probably due to earlier recognition and earlier operation. The recent statistics of Terrier and Auvray covering forty-five cases, all of which were operated upon, represent much improved mortality statistics. Among eleven cases of rupture five died, a mortality of 45.5 per cent. Among fourteen gunshot wounds four died, a mortality of 28.3 per cent., and among twenty stab wounds five died, a mortality of 25 per cent. The mortality of all the cases was 30 per cent. against the total mortality in Edler's

statistics of 66 per cent. Like all statistics of operative cases, these of Terrier and Auvray may be objected to on the ground that the successful ones are more likely to be published than the unsuccessful. They show, however, that with early diagnosis and prompt operative treatment much can be accomplished in lowering the very high mortality which the severer forms of wounds of the liver have had in the past. By collecting cases from hospital records and not from published sources, a more accurate idea can be obtained of the mortality of these injuries under present methods of treatment. I have made such a collection, excluding cases that were complicated by serious lesions of other abdominal organs or of other parts of the body which were clearly responsible in great measure for death. These cases occurred within the last ten years in New York hospitals with large accident services. They are twenty-five in number, and are divided as follows: ruptures, 12; gunshot wounds, 9, and stab wounds, 4. Death occurred in eleven cases, a mortality of 44 per cent. The cases which were treated by early laparotomy were twenty in number, with a mortality of 40 per cent. The mortality among ruptures that were operated upon was 62.5 per cent.; stab wounds, 33 per cent., and gunshot wounds, 28.5 per cent. These statistics are not quite so favorable as those of Terrier, but probably represent more accurately the actual mortality.

Treatment.—As far as the treatment of injuries of the liver is concerned, the modern tendency is towards early laparotomy, as in suspected injuries of any of the abdominal viscera. Open wounds should, without exception, be treated by enlargement of the wound, exposure of the liver, and determination of the site and extent of the injury to the organ. In this way can we alone be sure of excluding or finding associated injuries, removing foreign bodies, stopping hæmorrhage, preventing secondary hæmorrhage, and avoiding infection of the liver or of the peritoneal cavity. Care should be taken to examine the entire liver, as a second wound may remain unnoticed and give rise to fatal bleeding. Many cases of gunshot or stab wounds will doubtless recover by expectant

treatment, but other cases will die from some of the above accidents, which could have been discovered or avoided by enlarging the wound. The latter procedure adds little to the risk if done under favorable conditions, and if more generally employed will result in still better statistics. Some authors still recommend expectant treatment in these cases in the absence of urgent symptoms, such as hæmorrhage, on the ground that these milder wounds not infrequently result favorably without operation. This seems a wrong principle to work on. Many cases might recover without interference, but others will prove fatal from oversight of an intestinal perforation or foreign body, or from insufficient drainage of the wound in the liver.

The indications for operation in subcutaneous injuries are not so definite. In the absence of distinct signs of hæmorrhage, of marked rigidity of the abdominal muscles, of dulness in the right iliac fossa, and of increasing abdominal pain, an expectant attitude seems justified, even though the nature of the injury and the presence of shock point to some degree of laceration of the liver. The fact that these slight ruptures heal without incident has been abundantly proved by exploratory laparotomies where they have been found, the abdomen closed without further interference, and the patient gone on to prompt recovery. The lesions of the liver are circumscribed and not deep, the amount of hæmorrhage is slight, no bile-ducts are torn, and the risk of peritonitis is at a minimum. Under these conditions, the unnecessary exposure of the liver adds considerably to the risk; what was a mild subcutaneous injury is converted into an open one with all its possible consequences. In very young and weakly subjects the added shock of an exploratory laparotomy may turn the scale against the patient.

Matters are very different in the severer cases with well-marked and progressive symptoms of internal hæmorrhage, peritoneal irritation from accumulating blood, dulness in the iliac fossa, and that very important and never-failing rigidity of the abdominal muscles associated with a severe visceral rupture. Here the surgeon has no choice, and he must operate to

stop hæmorrhage. Furthermore, it is imperative to examine for the associated injuries of other viscera which so frequently accompany severe ruptures of the liver. In order to expose satisfactorily wounds of the convexity of the liver, it may be necessary to divide the lower ribs or cut the suspensory ligament.

The best methods of stopping hæmorrhage are by the use of sutures or gauze packing. If the former are used, they should include considerable liver tissue at the edges of the wound, and if possible go down to its full depth. Blunt needles as recommended by Mikulicz and Kader seem well adapted for suturing. Gauze packing is particularly suitable for contused wounds, gunshot wounds, and punctured wounds, and is, furthermore, a useful addition to suture. The thermocautery is of very little value in arresting hæmorrhage from the liver. The blood and bile can easily be removed by flushing the abdomen with hot saline or by dry sponging, according to the preference of the operator. Drainage is employed in subcutaneous wounds chiefly for the purpose of arresting hæmorrhage. In gunshot and stab wounds with a dirty instrument, it is a valuable means of preventing local infection of the organ or general infection of the peritoneal cavity.

The following conclusions seem to be justifiable. The prognosis of the severer cases of wounds of the liver alone has improved of late years, especially under early operative treatment. Many cases must necessarily, of course, be promptly fatal from shock or hæmorrhage or from associated injuries of other organs. Many others can be saved by operation which would otherwise die from hæmorrhage or some complication. The treatment of all open injuries should be early laparotomy for the purpose of hæmostasis, thorough examination, and prevention of infection. As regards subcutaneous ruptures, the mild cases without marked symptoms of collapse or internal hæmorrhage should be treated expectantly. Cases in which there are marked collapse or signs, local or general, of internal hæmorrhage should be treated by early laparotomy, with suture or packing of the wounded liver. The mortality of

wounds of the liver alone will in all probability diminish from year to year with the more general adoption of early laparotomy.

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CONGENITAL ELONGATION OF THE LEFT LOBE OF THE LIVER.

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CONGENITAL deformities of the liver confined to the left lobe, sufficiently extensive to cause symptoms, must be instructive, since careful search of the literature discloses the record of but one case that in any way could be regarded as analogous (Langenbuch, in *Deutsche Chirurgie*, 1897, Lieferung 45, Leber u. Gallenblase, 112). This case is described as a short corset liver where, in addition to the right lobe being pressed upward into the diaphragmatic space, the left lobe is pushed across in the left hypochondrium, where it developed so strongly as to spread over the entire fundus of the stomach, and even over the spleen. In this instance the right kidney was also pressed downward.

Symptoms in this case were pressure, pulling, and pain in the epigastrium. It was a woman thirty years of age, who had known of its existence for eight years. During this time she had suffered with abdominal pain when either standing or lying down, but especially in the latter position. When lying on the side or abdomen she had little or no pain, while on the back it was greatly increased. There were, in addition, palpitation of the heart, flushes to the head, a feeling of oppression, and constant gastric disturbance; there was also aching in the legs.

Langenbuch further remarks that the left lobe of the liver is rarely affected alone, though it is at times in conjunction with the right lobe. Enlargement of the right side of the liver rarely, if ever, could give this chain of symptoms, because of the difference in the organs pressed upon.

Treatment in his case consisted of incision and resection of the left lobe, secondary hæmorrhage following, which was

controlled by ligation of the vessels. Ascites existed for a short time after operation. Other authors refer to enlargement of the left lobe, but always in conjunction with the right, and most of them cite this one of Langenbuch's alone as an instance of left lobe enlargement.

J. E. Graham (in "Diseases of the Liver," Loomis—Thomas, "American System of Practical Medicine," 1898, p. 411) states that congenital changes in the form of an enlargement of the left lobe are greater than may occur in the right.

Murchison (in "Diseases of the Liver," 1868, p. 9) says that the left lobe has been found in the foetus larger than the right.

J. H. Waring ("Diseases of the Liver," 1897, p. 59) says that among liver anomalies the left may be long and thin, having been met with extending downward and to the left into the left hypochondrium, or even to the left lumbar region as far as the spleen, or even below this viscus. (His reference is to the case of Langenbuch to which I have previously referred.) When this form of lobulation occurs, it may be mistaken for large spleen, but is usually definable connected with the liver, and its very free movement during respiration would indicate the nature of the enlargement or swelling to be in the left hypochondrium.

The subject of this report is a girl sixteen years of age. She consulted me in June, 1893, for a painless tumorous distention of the epigastrium, which she had noticed for nine years, though she had been suffering from spells of distressing discomfort at times for only about two years.

History.—She had never been ill except when five years of age, then with measles; she was exceptionally well developed, indeed, presented all the evidences of a perfect physique, height being five feet, one inch, weight 130 pounds. She had never had jaundice, colicky pain, chills, nor fever. Her occupation as laundress for the last two years had seemed to increase the feeling of distress after eating. This feeling of distention and pressure in the epigastrium, palpitation of the heart, and dyspnœa had been prominent symptoms from which she had suffered from her

earliest recollection. She was entirely free from all of these symptoms, when in the upright position, when hungry, that is, when the stomach was empty. The symptoms were not complained of when she was lying partly upon her abdomen, though they were always present even when the stomach was empty, when lying upon her back.

On her first visit, which was shortly after having taken breakfast, the symptoms complained of were prominently brought out when she was placed in the recumbent position on the examining chair. Examination at this time showed what seemed to be an immensely distended stomach; there was very pronounced tympany above and below a dull area, which extended entirely across the epigastrium, being lost beneath the costal cartilages on either side. The fat belly walls made it somewhat difficult to determine whether or not the mass was influenced by respiration, but it seemed to be. With considerable pressure the edge of the right lobe of the liver could be felt just below the costal margin; dyspnœa seemed, as far as one could determine, due to the diaphragm being pushed up, the apex beat of the heart being heard most pronounced in the fourth interspace. The tumor was painless; the only complaint made was that percussion increased dyspnœa and caused nausea.

The condition had been variously diagnosed as gastroöptosis, distention of the hepatic flexure of the colon, hydatid or echinococcus cyst, or sarcoma of the liver. My own feeling was that it was in all probability a cystic condition, probably of the pancreas. The question of syphilis of the liver was hardly to be entertained. Temperature was normal, pulse in the sitting posture 78, while in the recumbent 120.

I examined the patient the following day, six hours after she had taken food, at which time there was a notable absence of tympany, no dyspnœa, but some distress in breathing when in the recumbent position. The apex beat of the heart was now most pronounced in the fifth interspace. The dullness extending over the tumor was unchanged. Urine analysis was negative; special attention was given to a search for bile pigment; none was present; blood showed normal count. Exploratory incision was the treatment advised.

Operation.—Under ether anæsthesia, the stomach was exposed through a median incision five inches long. The stomach

was found pushed down so that the greater curvature was on a level with the umbilicus. The left lobe of the liver extended entirely across the lesser curvature into the left hypochondrium, where it was flattened out at the extremity over the spleen. There were no adhesions present anywhere throughout its extent. It could be lifted from its position with no difficulty; it was exceptionally thin, and the capsule was apparently normal, if anything slightly thickened over the anterior surface where it came in contact with the abdominal parietes. No nodules were present, nor any other evidence of pathologic change. The right lobe was apparently normal; the right kidney was in normal position; the spleen was normal, except an indentation over its surface caused by pressure from the liver resting upon it. The pancreas was entirely normal.

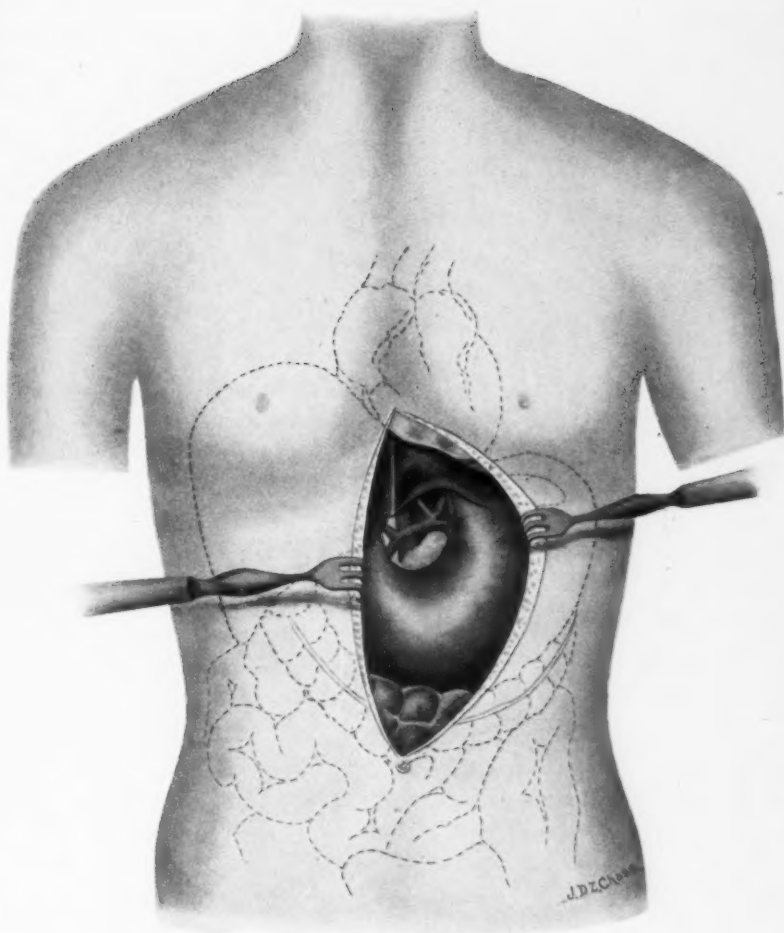
An effort was made to see how much of this elongated lobe could be replaced into normal position, but it was impossible to return any of it, because of the embarrassment to respiration that occurred when the slightest effort at returning the lobe was exerted. The entire lobe was then held up against the abdominal wall by an assistant while it was sutured. There was no bleeding of any note. The abdominal wall was then closed, and the girl's recovery was uninterrupted.

The results have been perfect; there has been entire disappearance of all digestive disturbance, and the girl regards herself as entirely well.

The tumorous convexity can still be seen, and the dulness is present as before operation; tympany, displacement of the heart, dyspnœa, nausea, and distress caused by position have entirely disappeared.

(The photograph and colored plate show the tumorous distention and the exact relation of the tongue-like elongation of the organ at the time of operation. The length of the lobe from the free margin of the liver to its apex was six and one-quarter inches; width, one and three-quarters inches.)

Ventrosuspension, in this particular case at least, seems to have been the proper line of treatment to carry out; and, indeed, in all cases where there is no malignant change, it would seem less dangerous and quite as liable to effect a permanently



Dog-tongued elongation of the left lobe of the liver. (Congenital?)



satisfactory result as resection, as has been shown by both Ponfick and Von Meister that resection of a part of the liver will be followed by a regeneration, consequently nothing would be gained by resorting to resection. (*Lancet*, 1890, i; 1891, ii, p. 1409.) While the history clearly shows that a marked deformity had existed from early childhood, there is no doubt but that there had been a process of gradual extension of this congenital tongue from the main body of the organ during the last two years, due to the patient's occupation, which caused a sufficient amount of trauma to encourage growth. There is no doubt but that this is a true case of congenital elongation of the left lobe of the liver, and not in any way belonging in the category of the so-called lacing liver. This type is found more often in an adult female (Langenbuch's case being more especially of this type), and in the larger percentage of cases involves the right lobe alone, or, when the left is involved, the deformity is always associated with right-sided enlargement. It is further shown by numerous autopsies that when the left lobe is deformed it is usually folded upon itself and more or less incurved.

**THE SURGICAL TREATMENT OF CHRONIC DYS-
PEPSIA DUE TO DEFECTIVE DRAINAGE, AND
CHRONIC INFLAMMATION OF THE STOMACH
RESULTING FROM GASTRIC ATONY AND
DILATATION.**

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A NOT infrequent cause of disagreeable and long-standing dyspeptic symptoms is gastric atony followed by chronic gastritis, moderate dilatation, and defective drainage of the stomach. These conditions, when of long standing, give rise to almost continuous dyspeptic symptoms associated with secondary neurasthenia, of more or less severity, and chronic constipation. Gastro-enterostomy, with closure of the pylorus, will give these patients complete and permanent relief, not only from the stomach symptoms, but also from the neurasthenia and constipation.

I do not accept the foregoing statements as conclusive; neither am I able to present proof that will be convincing to all; but I do believe that, if we bear these statements in mind, we shall occasionally find a chronic sufferer whose condition corresponds to them, and who can be completely and permanently relieved only by surgical interference.

It is generally admitted that fatigue of the gastric muscle, followed by gastric atony, elongation of the gastric muscle fibres, and consequently enlargement of the stomach cavity, does occur. Turck,¹ Kemp,² Rose, and others have discussed the occurrence of the loss of tone of the gastric muscle in detail. When the condition is only of temporary duration, its importance is overlooked; and in these cases, special attention has been given to the secretory derangements of the organ as a cause of the symptoms. When the muscle tonus of the stom-

ach is lost for a considerable period of time, chemical treatment does not relieve the symptoms. This fact has led observers to study disturbances of the motor functions of the stomach and to pay less attention to secretory derangements and chemical treatment. Mayo³ says that "it is the mechanics of the stomach that is usually at fault and not its chemics; and it is for this reason that surgery is rapidly invading the field." Of course, secretory disturbances of the stomach occur, associated with motor disorders, and independently of them; but they are doubtless of secondary importance in producing symptoms. In fact, Einhorn has shown that even achylia gastrica can occur, and produce no symptoms if the motor function of the stomach is not impaired.

If we attribute the symptoms of some cases of chronic dyspepsia to primary muscular atony and insufficiency, the succession of changes in these long-standing cases would seem to me to be the following:

The continuous atony of the stomach musculature results in incomplete emptying, or deficient drainage, of the organ, either from a resulting pouch formation, or from lack of muscular force to expel the stomach contents. The material that remains in the stomach undergoes chemical changes resulting in the formation of products that have a local effect on the mucosa of the stomach, and are absorbed and are capable of producing more or less marked general changes. The local changes produced in the stomach are very likely to cause a chronic inflammation of the mucosa, which, of course, would be responsible for the symptoms of a chronic gastritis. The general changes, due to absorption of chemicals from the stomach, may vary greatly in their effects and intensity. Secondary anæmia, which, as Hunter has suggested, may advance to pernicious anæmia, might occur. Of other possible conditions that might result from absorption of toxic stomach contents, I shall mention only those due to involvement of the nervous system.

We have for some time recognized severe cases of tetany due to stomach toxæmia. Examples are recorded by Cunning-

ham,⁴ Robson,⁵ Fleiner,⁶ Carnegie,⁷ Albu, and others. I have no doubt that nervous symptoms, less severe than tetany, can and do occur as a result of defective gastric drainage. I am of the opinion that the neurasthenia, so commonly associated with chronic dyspepsia, is not primarily dependent on some change in the nervous system, but is the result of the action of toxic products absorbed from the stomach. The theory that the nervous symptoms are primary, and that the dyspepsia is secondary and dependent on a primary nervous disease, is improbable. We must admit, however, that lesions in the nervous system are capable of producing stomach symptoms and definite gastric changes. Carion and Hallion⁸ found that section of the vagus nerve is sufficient to produce complete atony and permanent dilatation of the stomach of the dog. Pawlow and Katschkowsy⁹ have shown that cutting even both vagi nerves produces only a temporary disturbance of gastric movements. These and many other experiments, though not without value, are by no means convincing. Regarding them, Ewald¹⁰ says, "Yet all these experimental stimulations in mammals have an indefinite and uncertain character; their success is not great, and by no means constant."

On the other hand, we have examples of tetany being relieved by drainage of the stomach; and we also have examples of the disappearance of nervous symptoms following drainage of the stomach for obstructions of the pylorus. I think we can safely say that it is probable that many times a neurasthenia is present as the result of absorption of toxic products from a stomach that does not drain properly.

Another symptom that is usually complained of by the patients suffering from gastric atony, inflammation, and defective drainage, is chronic constipation. The cause of the constipation might be due to the small amount of solid material that these patients usually pass into their intestines. Lohrlich¹¹ says that the absence of a sufficient quantity of dry residue in the intestines inhibits the growth of the intestinal flora and diminishes the production of indol, skatol, etc. The absence of

sufficient quantities of these stimulants of the bowel explains the constipation. I believe that the constipation in these cases is not accidental, or due to independent causes, but is the result of the defective drainage of the stomach. It was present in the three cases that I operated upon; and I have seen it present in other conditions that interfered with the drainage of the stomach. Gastro-enterostomy usually cures the constipation in these cases. Waterhouse¹² reports thirty-one cases of gastro-enterostomy on patients suffering from defective drainage of the stomach and chronic constipation. In all of these patients no constipation existed after the operation. Murphy and Ochsner¹³ have not seen cases of constipation, following properly done gastro-enterostomies, unless produced by some definite local cause.

The recognition of defective drainage of the stomach due to chronic gastric atony and inflammation is made from the symptoms of chronic dyspepsia associated with neurasthenia and chronic constipation, and by excluding other stomach lesions that would produce similar symptoms. Obstruction of the pylorus, displacements, ulcer, tumors, and deformities usually present some symptom more or less characteristic of the condition present. I shall not go into the symptomatology or diagnosis, but shall be content with making a statement regarding the indication for operation in these cases. Any case of severe and long-standing dyspepsia that resists all generally advised methods of treatment, and that shows no permanent improvement after giving the stomach absolute rest for two weeks by rectal feeding, should be submitted to a laparotomy. This advice may be too radical to accept, but I believe, from the statements of Kemp, Cramer, and others advising operations on the stomach, that we shall lose little if we follow it.

If we can relieve these cases by gastro-enterostomy, as I have done in three instances, and if the good results following gastro-enterostomy for benign conditions prove to be permanent, we are justified in advising operation for all serious cases of chronic dyspepsia that will not yield to less radical treatment.

CASE I.—J. B., a miner, forty-eight years old, said that he had suffered from "stomach trouble" for twelve years. He complained at times of more or less pain in the epigastrium, soreness of the stomach, belching of gas, "sour stomach," loss of appetite part of the time, and constipation. He vomited occasionally, but had vomited less during the last three years than previously. His appetite was poor most of the time, although occasionally he would have a desire to eat. His illness, though very distressing, did not prevent his working part of the time.

Examination showed the patient to be anæmic and somewhat wasted, but not markedly emaciated. He was plainly neurasthenic, and had been so for ten years. Physical examination of the internal organs revealed nothing abnormal. The blood showed changes that corresponded to a moderate degree of secondary anæmia. The urine revealed nothing abnormal. Inflation of the stomach with acetic acid and sodium bicarbonate showed that the organ was considerably enlarged. The stomach contents contained free hydrochloric acid twice out of three examinations. Organic acids were found at each examination. The results of examinations by means of the tube and test meals revealed nothing that indicated a definite stenosis of the pylorus.

In the way of therapy, the patient had received only medical treatment. This consisted of the remedies prescribed by various physicians, and many patent medicines and remedies that he had been advised to take by his friends.

I washed out his stomach several times,—usually obtaining a considerable quantity of mucus at each washing,—and placed him on a liquid diet. He improved somewhat, and after six weeks resumed his work. He returned in one month and said that he was no better. After placing him on rectal feeding for two weeks, I did an exploratory laparotomy.

The stomach was much dilated and its walls were very thin. The pylorus was not indurated and did not seem narrowed. The gall-bladder and appendix appeared normal. There was no enlargement in the region of the pancreas. An anterior gastro-enterostomy was done with a Murphy button.

The patient recovered without difficulty, and at this time, two years after the operation, is well and strong. He eats the same food as do the other members of his family. He no longer

complains of "stomach trouble or nervousness," and is not constipated.

CASE II.—A merchant, fifty-two years of age, had suffered for fourteen years with "stomach trouble," neurasthenia, and constipation. His gastric symptoms did not differ materially from those of Case I. They did not correspond to a definite stenosis of the pylorus. In this case I was unable to determine, by the use of the stomach-tube and test meals, that the stomach did, or did not, empty itself with readiness. At times the ingesta would remain in the stomach for several hours, and again the organ would appear to empty itself in a very short time.

He had been a user of the stomach-tube for years, and would wash his stomach nearly every day, and sometimes three or four times a day.

I treated him in various ways for six months, while he watched the progress of Case I, and then operated upon him.

The stomach was considerably dilated with thinned walls. The pylorus seemed normal. No other abnormal changes were found. I did a posterior gastro-enterostomy by the suture method.

The result was as gratifying as in Case I. The gastric symptoms, neurasthenia, and constipation rapidly disappeared. At this time, eighteen months after the operation, the patient remains well.

CASE III.—A commercial traveller, thirty-eight years of age, had complained of chronic dyspepsia for seven years. Until three years ago he had been a heavy drinker of beer and whiskey. He had attributed his dyspepsia to the excessive use of alcoholics, and ceased using them three years ago. This gave him little or no relief.

He was typically neurasthenic and chronically constipated.

Examination revealed nothing that would point to anything but a chronic gastritis and a somewhat dilated stomach as the cause of his symptoms. As the patient had tried almost every known method of treatment, I advised operation without further delay.

Operation revealed a moderately dilated stomach. Its walls were not much thinner than normal. The pylorus showed no evidences of being constricted. The remainder of the abdominal organs revealed nothing abnormal. I did an anterior gastro-

enterostomy with a Murphy button, and practically closed the pylorus in the following manner: I flattened the pylorus and freshened the peritoneum covering its anterior surface by scraping with a knife. I then placed four catgut sutures in such a manner that their tying approximated the superior and inferior borders of the flattened pylorus. These sutures, without penetrating the mucosa, simply folded the pylorus on itself by bringing its superior and inferior borders together. I am quite satisfied that this method will close the pylorus temporarily, but I have no way of knowing the permanency of the closure. I closed the pylorus in this case because some had claimed that a gastro-enterostomy with a patent pylorus was apt to be followed by unpleasant symptoms, and perhaps closure of the gastro-enterostomy opening. I did not attempt to close the pylorus in the previous two cases; but in these the stomach walls seemed very atrophic, and it was improbable that the stomach regained much muscular power even after being perfectly drained.

The patient made a complete recovery, and at this time, five months after being operated upon, is in good health. His stomach no longer gives him trouble, and his "nervousness" and constipation have disappeared.

I have purposely omitted a discussion, in detail, of the symptoms, physical and chemical findings, and diagnosis in these cases. The diagnosis is made by exclusion, and, in my experience, has not always been correct. In one case in which I expected to find only a dilated and atonic and chronically inflamed stomach, I discovered a beginning carcinoma of the pylorus. I did a pylorectomy. This was eighteen months ago, and the patient still remains well. In two other cases a definite benign stenosis of the pylorus was found. In a fourth case, a cirrhosis of the stomach was present. A detailed report of this case was published in the March number of the *ANNALS OF SURGERY*, 1904.

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CONTRIBUTION TO THE SURGERY OF GASTRIC ULCER.

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CASE I.—*Traumatic Ulcer of Stomach; Profuse Hæmatemesis; Gastrotomy; Detection and Ligation of Ulcerated Area; Recovery.*

H. M., twenty years old. No previous diseases, family history good. Two weeks ago, while pitching hay, he broke the handle of the pitchfork and tumbled backward, bending his spine and overstretching his abdomen. He kept on working, and felt all right in every way until a few days ago, when a slight but daily increasing discomfort in the left hypogastrium began. This feeling finally disabled him from work and made him seek medical aid. He is a sturdy-looking farmer of middle size, does not look sick. On examination nothing abnormal is found in any of his organs, except a slight soreness over a distinct area in the left hypogastrium. He received a tablespoonful of castor oil, and as there was no movement after six hours, a soap enema was given and his lower abdomen gently massaged. The large ensuing movement was partly yellow, partly tarry. Before he got up from the chair he fainted, and vomited nearly two quarts of fresh blood mixed with black clots. He was at once carried to bed; a light ice-bag applied over the stomach, bismuth and adrenalin given by mouth; light feeding by rectum. On the third day an acute pain was complained of over the ascending colon, which made the nurse apply an ice-bag over this place. In the following night he was taken with another hæmorrhage of nearly a quart. No other stimulants were used, although patient felt pretty weak; but the same medication as before continued and immediate operation advised. His pulse had risen from 64 to 88, and remained of fair quality.

Upon the presumption that he was suffering from a traumatic ulceration of the stomach, the abdomen was opened, but neither inspection nor palpation revealed the site of an ulcer. A

vertical incision was then made through the stomach wall, and with a large speculum and an electric headlight a patient search for the ulceration was instituted, starting to the left, where soreness had been complained of. The chloroform narcosis was well borne, and at the end of nearly an hour a shiny white spot of about a bean's size to the right of the spine and on the posterior wall of the stomach came into sight. With long forceps this part was raised out of the abdomen, at the same time removing the speculum, and a silk thread catching mucosa and muscularis was carried round the defect. The bismuth thrombus evidently occluded a perforation in a large ascending artery. The purse-string was now tied, without removing the supposedly aseptic thrombus, sufficiently tight to bring close together, but not to bleach, the included mucosa, and the parts dropped back. There was no more bleeding and no other ulcerations were found. The stomach incision was closed by three rows of suture and the abdominal wound closed in the usual way. For two weeks patient was fed by rectum, and after three weeks discharged, with careful injunctions as to his diet.

The intestines had not had any rough handling; in fact, except for the first palpation, the stomach was never touched by the fingers. There was never any pain nor vomiting, though the patient had been under chloroform more than two hours. He has been perfectly well, doing hard farm work for the last fourteen months.*

The following points deserve attention: First. The place of soreness did not correspond to the location of the lesion, and time might have been saved by concentrating the attention from the beginning to the pyloric half where such lesions are usually found. Second. The location of the ulcer seems to uphold the theory that it is the pressure of the spine against the full stomach which causes traumatic ulcers in similar conditions. Third. The fact that the white bismuth thrombus freed superficially from the admixture of blood by digestion gave great help in locating the trouble makes it advisable to

* Since his operation, the New York Life has issued an insurance policy on his life.

give large doses of this drug during or right after a gastric hæmorrhage, that it may be included in the thrombus if surgical intervention is intended. Fourth. This patient is certainly better off than he would be if, following the fashion, we had performed gastro-enterostomy, and for acute hæmorrhagic ulceration our proceedings should always be considered the ideal operation.

CASE II.—*Annular Ulceration at Pyloric Region of Stomach; Stenosis of Pylorus; Perforation of Stomach Wall, with Formation of Post-gastric Cavity confined by Inflammatory Adhesions; Posterior Gastro-enterostomy; Death.*

Mrs. E. S., aged forty-eight years, had been troubled with indigestion, pain in the stomach, vomiting, and costiveness since girlhood. A year and a half ago I saw her first in consultation. She had been vomiting large amounts of nearly clear fluid, was unable to retain anything in her stomach, and had very severe pain in the right epigastrium. She was poorly nourished, with a sal-low complexion and an expression of suffering; pulse, 100; temperature, 99.5° to 101° F. Her tongue was red and glossy; her teeth had lost their ivory, looking rather transparent like horn; her breath had an intense odor like chloroform. Urine, light colored, gave the diacetic acid reaction; she was belching up gas at frequent intervals. Through the thin abdominal walls the stomach could be felt ballooned, but little enlarged; to the right, just below the ribs, was an induration about three inches in diameter very painful to touch; the percussion note here was dull tympanitic. Vomitus contained much hydrochloric acid, and had a strong peptic action. Diagnosis, hyperchlorhydria, chronic ulcer, with perforation and perigastric adhesions near the pylorus. She eventually recovered from this attack, but a slight induration and pain remained. She has had about eight similar attacks since, but much lighter, till her coming to the hospital, December 19, 1903.

Operation had been most urgently advised from the beginning, but for business reasons she had postponed it again and again. Her intermediary attacks lasted from four to eight days, after which time she felt well and able to digest her food. She finally allowed herself to be taken to the hospital after ten days had gone by without any improvement. Since the fourth day her

bowel had become intolerant to rectal feeding. At laparotomy the pyloric part of the stomach was found transformed into a large tumor with smooth surface adherent towards the spine. A posterior gastro-enterostomy was done by the McGraw ligature and the abdomen closed. The operation had been speedily done under chloroform and the patient rallied on the table. No shock. For six hours she did well, cheerfully talking to her relatives; later complained of slight pain. She received an eighth of morphine, then gradually sank, and twenty hours later was dead. Vigorous stimulation with adrenalin, strychnine, hypodermoclysis were of no avail. The respiration stopped long before the heart ceased beating.

Post-mortem: after opening the stomach the walls were found atrophic, the pyloric part surrounded by a broad annular ulceration with pouting outlines; the pylorus itself was transformed into a small triangular slit permeable for a probe, the surrounding tissue of cartilaginous hardness. Immediately above the pyloric opening the ulceration had dissected loose a bean-shaped piece of the indurated stomach wall, which was still adherent for a quarter of an inch by a thin bridge to its original position, and could be made to drop down like a valve in front of the pyloric opening, closing it perfectly. Directly backward from the pylorus was a smooth opening permeable for the tip of the little finger; this led into a cavity of about two inches in diameter, with smooth surface obliterating the Winslow foramen; pancreas and omentum formed the walls of this cavity. No changes in or around the gall-bladder. Microscopically, malignancy was excluded.

The inanition had been caused by this strange valve formation at the pylorus which evidently had developed but lately. During the last year of her life the patient had repeatedly observed that by making pressure on the epigastrium over the tumor she could relieve a heavy feeling that came on during digestion, and immediately would belch up a great deal of gas. A condition like this may easily lead to the diagnosis of hour-glass stomach. How much the circumstance of her pancreas being exposed to the gastric juice may have had to do with the diacetic acid formation in her system can only be suspected.

CASE III.—*Gastric Dilatation with Perforating Ulcer marked by Symptoms of Appendicitis; Tetany; Hæmatemesis; Death.*

Miss M. R., aged sixteen years, was seen in consultation with Dr. Miner. She was a tall, slender, pale, poorly nourished girl. For a few days she had experienced pain of a continuous character which extended from her back and right hypochondrium into the right leg. She walked with a limp. Temperature, 103° F.; pulse, 110. Abdomen not rigid, sore to touch in the lower right quadrant; her face did not express pain, but she looked tired. Tongue red, no headache. Slight nausea had existed for a few days, but no vomiting; bowels costive, urine free, pressure on McBurney's point was distinctly painful. Nowhere else could any pain be elicited by pressure. The hip-joint was perfectly free. Castor oil, with absolute rest and no feeding, was ordered. Temperature rose in six hours to 105° degrees, pulse 112. On the following morning, after several good bowel movements and a very restless night, temperature was 105° F., pulse 118, other conditions same as before, no tumor formation over the right ileum. No enlargement of spleen. A diagnosis was made of appendicitis, probably gangrenosa, and operation was performed. On opening the abdomen by muscle splitting, the appendix looked pretty normal; there were no adhesions. It was removed and found filled with tomato seeds and a yellowish brown ill-smelling pulp down to the tip. There was no stricture. It was noticed that the ileum looked slightly purplish and the liver came down an inch and a half below the ribs in the axillary line. Peritoneum as far as visible had the normal gloss everywhere. The wound was closed and further developments awaited. The temperature fell steadily, till on the evening of the second day it was 100.7° F., pulse 100. She had taken milk whey and liquid peptonoids during the day and slept well that night. Became restless and irrational on the third afternoon. On the fourth morning, temperature 100.3° F., pulse 108. She was nearly unconscious, had to be catheterized. Slight icterus. On the fifth day deep coma, urine passed involuntarily, rectal injections were not retained, jaundice fully developed. No abdominal facies. Her jaws were tightly set, arms and legs in continual incoordinate motion, temperature and pulse went up. Abdomen full, not rigid; no bowel movement since operation; frequent singultus. The lower left side of the abdomen was bulging, dull on percussion with large wave of fluctuation. Wound looked and felt normal. Over the lower lateral part of the liver there was a feeling of crepitation like air below the abdominal

walls. After forcing the jaws open, a stomach-tube was introduced, and nearly three quarts of dark bloody fluid with some larger blood-clots removed; a great amount of gas passed out through the tube. Immediately the abdomen collapsed and became soft. The wound and neighborhood were found to be absolutely normal, percussion of the sides now gave no dulness. On the sixth day temperature nearly 103° F., pulse between 120 and 150, nutrient enemata not retained, very little urine voided involuntarily. The clinical picture of *tetany* was now fully developed. Hypodermic strychnine, adrenalin, and large saline infusions. On the sixth and seventh days four hot baths of 110 degrees were given. Her temperature averaged 102° F., pulse 130. On the eighth day the tetany movements had perfectly ceased, jaundice had nearly disappeared, and consciousness had returned. Her pulse had gone down to 108. She was given fluid by mouth. Diuresis was started so that she voided altogether, spontaneously, fifty ounces of high-colored urine within thirty hours. Some hard pieces were removed from the bowels by enema. But temperature rose again to 105° F. and pulse to 150. A test with the stomach-tube after the first twenty hours of feeding by mouth gave only one ounce of greenish fluid, so feeding was continued. Nevertheless, the bulging over the left iliac region and the jaundice increased again, singultus came on, and the next time the stomach-tube brought away over a quart of nearly pure blood. The body became covered with petechial hæmorrhages; the wound began to bleed. She died on the eleventh day. No post-mortem was allowed. I highly regret this latter circumstance; nevertheless, I deem it opportune to report the case. The diagnosis made on fifth day has been gastric dilatation with perforating ulcer, tetany, hepatoptosis, icterus caused by kinking of the gall-ducts from traction on duodenum and liver. The impossibility of getting any fluid beyond the sigmoid flexure was evidently due to the gastrectasia. Possibly there were adhesions. The girl died from highest emaciation and intoxication. Getting nourishment into her had been for days the *indicatio vitalis*, and as the rectal route remained impossible we had to feed by mouth. With what promising results, the diuresis shows. But the immediate relapse of gastric dilatation brought on the end. I especially wish to call attention to the marked influence of the hot baths upon her nervous condition.

The diagnosis of gangrenous appendicitis had been based upon the local soreness over McBurney's point with radiating pains in right side and leg, nausea, high fever increasing even after bowel movement, high pulse-rate, absence of palpable adhesions, and absence of any other detectable conditions which might account for the fever. With this diagnosis fairly established immediate operation was imperative. Her fever fell after operation in a way that would seem to substantiate the diagnosis. The condition of the ileum raised the question of typhoid, but the clinical facts did not uphold this idea. The girl had the habitus of general splanchnoptosis. I cannot lay the gastric dilatation to a belated influence of the narcosis, which was short, light, and not followed by nausea or shock. There was no septic peritonitis; in consequence, the only explanation for aseptic air-bubbles in abdomen is offered by accepting a small gastric perforation. With this diagnosis once suggested, gastro-enterostomy would have been performed at the earliest possible chance. This chance never came.

PENETRATING WOUNDS OF THE ABDOMEN.¹

REPORT OF SIX CASES OF GUNSHOT AND STAB WOUNDS OF THE ABDOMEN.

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Surgeon to the City Hospital.

IN the past eighteen months, six cases of penetrating wounds of the abdomen have come under the writer's personal observation. Five were pistol-shot wounds of the abdomen and one was a case of stab wound of the abdomen.

CASE I.—*Penetrating Stab Wound of the Abdomen; Wound of the Cæcum; Extensive Fæcal Extravasation; Laparotomy; Recovery.*

J. H. M., aged twenty years, was brought to the City Hospital in a baggage-car, from Washington, Pa. When visited at the B. and O. Station he was found to be suffering some shock, and was lying in a pool of blood and fæcal matter; his torn abdomen was covered with a filthy coffee sack.

On the operating-table a ragged wound was found in the right iliac region, just below and a little external to McBurney's point. Enlargement of this wound revealed an opening about an inch in length penetrating the cæcum. It was learned that the vulnerating weapon was a kitchen carving-knife, which accounted for the large and ragged nature of the wound. In the carefully made peritoneal toilet a quantity of fæces and clotted blood was removed. The wound in the viscus was closed with a double row of Lembert sutures, a large glass drainage tube was inserted in the direction of the pelvis, and several cigarette drains were advantageously placed. The wound was closed in the usual way. Patient made an uneventful recovery.

CASE II.—*Pistol-shot Wound of the Iliocostal Space; No Evidence of Abdominal Penetration; Expectant Treatment; Recovery without Surgical Intervention.*

¹ Read before the West Virginia State Medical Association, May, 1904.

T. H., aged thirty-four years, saloon-keeper, on the night of July 4, 1903, was shot with a .38-caliber ball at close range. The ball entered the iliocostal region on the left about one inch above the crest of the ilium.

The location of the wound, the probable course of the bullet, the absence of hæmaturia or any significant signs, and the recognition of the fact that probing is fallacious and harmful, lead to expectant and conservative measures in this case.

The skiagraph picture was unsatisfactory and failed to reveal the location of the ball.

The patient recovered without operation, and is in good health to-day.

While Case II was probably not a wound penetrating the abdomen, however, because of the location of the traumatism and the speedy recovery without symptoms, it was not thought out of place to include it in this series of cases.

CASE III.—*Pistol-shot Wound of the Abdomen; Nine Perforations of the Jejuno-ileum; Abdominal Section Three Hours after the Shooting; Recovery.*

A. G., aged thirty years, mill-worker, married, a resident of Martin's Ferry, and a patient of Dr. Hervey. On admission to the City Hospital on the night of June 2, 1903, patient was in shock, and an examination revealed a wound of the abdomen about two and a half inches above and a little to the left of the umbilicus.

An incision about six inches in length was made with the wound marking the mid-point. On opening the cavity of the peritoneum, it was evident that much damage had been done to the small intestine, as there was blood, faecal matter, and some food stuff in every direction.

Many gallons of decinormal salt solution were used in cleansing the abdomen. All hæmorrhage was arrested and the openings in the intestine and mesentery were closed. The glass tube and gauze wicks were used for drainage in this case as in Case I. In one place the ball had torn the long diameter of the gut, seriously compromising the integrity of the viscus, over an area of two and a half inches, but this was repaired without resection.

The duration of the operation was almost three hours; patient left the table with a pulse of 140 and subnormal temperature.

The tube was removed on the fifth day; the first bowel movement was on the fourth day; no food passed his lips for forty-eight hours; after that time iced panopepton seemed to satisfy his craving for nourishment until the end of the first week. Patient's recovery was most gratifying, his temperature never going beyond $99\frac{1}{2}^{\circ}$ F. He was discharged cured July 9, five weeks from the day he was shot.

CASE IV.—*Pistol-shot Wound of Abdomen; Slight Laceration of Liver; Non-penetrating Wound of the Ascending Colon; Laparotomy; Recovery.*

W. B., aged twenty-two years, negro waiter, was admitted to the City Hospital November 29, 1903, suffering with two pistol-shot wounds of the abdomen. There was an unusual amount of pain and well-marked muscular rigidity.

Patient was under the anæsthetic within one hour of the time of the shooting. On examination, one wound was found to enter the soft parts at the free border of the ribs on the left side in the mammary line. The course of this wound had every appearance of having penetrated the abdomen, but a median explorative incision in the epigastrium demonstrated that the ball had tunnelled beneath the muscles transversely and lay under the cartilage of the seventh rib on the right, where it was easily removed.

The second ball broke the cartilage of the ninth rib on the right, entered the abdomen, lacerated the outer surface of the right lobe of the liver; it severed completely one of the appendices epiploicæ, the base of which was bleeding rather freely. There was also a non-penetrating wound of the ascending colon, extending through the muscular coat. The necessary repair was made, all bleeding arrested, and drainage applied as in the previous cases. Recovery complete and uneventful.

CASE V.—*Pistol-shot Wound of the Abdomen; Beginning Diffuse Septic Peritonitis; Thirteen Perforations of the Intestine; Laparotomy Twenty Hours after the Shooting; Recovery.*

W. K., negro, aged eighteen years, was brought to the City Hospital, from Fairport, Ohio, by Dr. Walker, of St. Clairsville, December 25, 1903. On admission, pulse was 120 and of poor quality; respirations somewhat labored and costal; temperature, 102° F. The abdominal muscles were hard; there was some tympany. Patient was unable to retain anything on his stomach for several hours before admission. He had been shot by an Italian the day

before, the ball entering the abdomen one inch below the umbilicus, almost in the median line.

Under ether anæsthesia, an ample incision was made in the median line.

On opening the peritoneal cavity, it was evident that there had been considerable loss of blood, and this was lying in puddles with half-digested food and fæcal matter.

Already a progressive fibrinopurulent peritonitis was beginning to show itself, in flakes of tenacious yellowish material deposited over the surface of the intestinal coils. Thirteen perforations were found and repaired, using a double row of Lembert sutures for each opening.

The toilet of the abdominal cavity and carefully directed drainage were practised as in the previous cases.

It is interesting to reflect with Douglas ("Surgical Diseases of the Abdomen," p. 17) that the peritoneal cavity into which this poisonous material is suddenly deposited is lined with a membrane which is tunnelled with measureless lymph and blood tubes, and that this membrane is in extent perhaps as great as the whole integument of the body, and capable of absorbing in a single hour from 3 to 8 per cent. of the entire body weight; hence the call for immediate interference in all of these cases.

The reason for the delay in this case was, however, unavoidable; the accident having occurred remote from a railroad and many miles from any medical aid.

The drainage tube was removed on the sixth day, and recovery was complete and uninterrupted. Patient was dismissed well in one month from the day he was admitted.

CASE VI.—Pistol-shot Wound of the Abdomen; Eight Perforations of the Intestines; Profuse Hæmorrhage and Shock on Admission; Laparotomy; Death.

J. C., aged twenty-six years, Italian, was shot by a policeman at Bellaire, Ohio, January 10, 1903. He was admitted to the City Hospital, about four hours after the shooting, in profound shock, with a bullet wound two inches below and to the right of the umbilicus.

Under chloroform narcosis the abdomen was opened, and there immediately gushed out a quantity of blood.

The hæmorrhage was from the mesosigmoid and was soon arrested, but not until the patient had been almost exsanguinated.

There were six perforations of the intestine, but very little escape of intestinal contents.

The necessary repair was made in this case and every effort made to restore the depleted circulation, but all to no avail. The patient never rallied from the original depression, dying in about twenty hours after admission.

Certain conclusions seem to be evident in reviewing the histories of a series of cases of this kind:

First, recognizing that visceral injury follows in 97 per cent. (Douglas) of penetrating gunshot wounds of the abdomen, immediate laparotomy, with a liberal incision, should be practised in every such case.

Second, the symptoms exhibited by the patient, the location of the wound, and the course of the bullet should rather be used for determining the presence or absence of penetration, as the use of the probe is not only harmful, but may lead to false conclusions.

Third, well-directed drainage in all cases in which there has been visceral perforation is of the greatest importance.

HEPATO-CHOLANGIO-JEJUNOSTOMY.

FOR COMPLETE CICATRICAL OBSTRUCTION OF THE HEPATIC AND
COMMON DUCTS.

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ALTHOUGH the clinical aspect of the case I am about to report presents many features of peculiar interest, it is more with the particular operation performed that I am induced to publish it.

I will first narrate the history of the case and conclude with my remarks upon it.

W. McC., aged fifty-two years was admitted into the Victoria Infirmary on September 12, 1899, complaining of pain in his stomach, and vomiting. The onset of his symptoms he attributed to an accident which occurred twenty-two years ago, when he was struck over the lower ribs on the right side while at his work on the railway. This was immediately followed by a severe pain at the seat of injury which continued for several weeks. The pain lessened, and for a time he remained free for intervals sometimes of months. Some of these intermittent attacks were exceptionally severe, and on one occasion, about two years ago, an attack was accompanied by hiccough and vomiting for twelve days afterwards. He generally noticed after an attack some yellowness of his skin and conjunctiva, and on one attack, three years ago, there was severe jaundice which lasted for three weeks. The seat of the acute pain was usually in the epigastrium.

On September 23 the abdomen was opened in the middle line above the umbilicus, and, as the mischief was discovered in the region of the gall-bladder, a second incision running transverse to the first had to be made. On digitally exploring the involved region it was found that the gall-bladder had become, or was replaced by, a shrunken, indurated mass of tissue, em-

bracing in the matted area the liver, the pyloric end of the stomach, and the hepatic end of the transverse colon. The stomach was not dilated. An exploratory incision was made into it and the pyloric orifice digitally examined. No puckering as the result of ulceration could be detected, nor was the pylorus or the first two inches of the duodenum in any way obstructed. The colon was similarly opened and the involved region digitally examined. No constriction could be detected, but directly opposite the most markedly indurated mass a slight indentation was felt, suggestive of the possible healing of an opening through which a gall-stone might have passed.

There being no obstruction either about the colon or the pylorus, it was deemed inadvisable to attempt the severe measure of separating the intimately attached viscera. The wound was therefore closed.

On December 12, that is about eleven weeks after his operation, the patient reported himself; and the note taken of his condition at that time was, that he had gained ten pounds in weight and he was quite free from his old pain, which he never now felt.

The patient was lost sight of for nearly four years, when he presented himself at the hospital on October 1, 1903. The report of his condition at this time was that up to about three months ago he had enjoyed good health, but at this time he began to get jaundiced. He never, however, suffered any pain, and he had been able to keep to his work till about two weeks ago. On examination, he was seen to be very poorly nourished and muscles very flabby. His skin was of a uniformly yellow color all over his body. His appetite was very poor and he took very little food. Abdominal palpation revealed nothing,—no apparent enlargement of liver or dilatation of stomach. There was a marked ventral hernia at the upper part of the median cicatrix. The urine was deeply bile stained and the fæces clay colored.

On seeing the man on the present occasion, I felt that his jaundice possibly depended on some chronic obstruction to the hepatic or common duct, and, remembering the difficulties that I had experienced at the first operation, I could not see my way to make any further attempt to deal with it by re-exposing the parts. The patient accordingly left the Infirmary.

He presented himself again about seven months later on May 17, 1904, desirous that I would do something to remedy the ventral hernia, which was a source of trouble to him. His general condition had undergone very little change. His skin was still deeply bile-stained, and he presented all the symptoms of obstructive jaundice.

Believing the case to be one of chronic obstructive jaundice due to constriction either of the hepatic or common duct by old inflammatory adhesions, I determined to attempt a method which had been adopted successfully by Professor Kehr, of Halberstadt, in a similar case, that is to say, establish a communication between the dilated ducts in the liver substance and the duodenum.

The following operation was therefore performed:

The abdomen was opened by an incision along the course of the old transverse cicatrix and extended both in front and backward to give the required amount of room. Extreme matting of parts was encountered, and, although portions of adherent omentum were removed, it was found quite impossible to distinguish the pylorus and duodenum. The liver, which was much shrunken and of a deep mottled purple color, lay high up under the ribs. With the kind assistance of my colleagues, Dr. Grant Andrew and Dr. Elizabeth Pace, I was enabled, though with much difficulty, to stitch the jejunum to the margin of the liver for about two inches by means of a continuous sulphochromic-gut stitch. The liver was then incised for about one and a half inches, the bowel opened for the same extent, and the opposing surfaces beyond the two cuts were united by interrupted stitches.

The extreme friability of the liver and the depth at which we had to work rendered this part of the operation one of great difficulty. In order to avoid any possible tension on the stitched gut, for it seemed almost impossible for the stitches to secure a hold, the bowel was anchored at the upper part to some adherent omentum to relieve any possible strain on the bowel stitches. A separate incision was made posteriorly to drain the right lumbar fossa. It should have been noted that after deeply incising the liver there was very free oozing of dark purple fluid, which was to some extent checked by the application of the actual cautery.

The anæsthetic was given by Dr. David Lamb, and the operation lasted for an hour and fifty minutes. The patient was

a little sick after the operation, but otherwise he bore it well. He made an uninterrupted recovery, neither temperature nor pulse rising. On the second day after operation, it was thought that his motions were somewhat darker in color, but further than this transitory result, no other change in his general condition seems to have occurred. He left the hospital eleven days after the operation in order to be under his own medical attendant at home.

I saw him on June 16, when his wound was nearly healed; the only real difference in his general condition being that of slowly increasing emaciation and weakness. This condition of exhaustion seemed slowly to increase until he died about a month later. There was unfortunately no post-mortem.

Remarks.—A feature of special interest in the clinical history of the case concerns the injury which the man stated he received some twenty years ago, and from which time he dated his illness. The blow which he received over the lower ribs of the right side seems to have been a severe one, for not only was it followed by acute pain in the region, but for several weeks he was laid up with it. Except for this history of an injury, and the fact that pain had occurred off and on since its receipt at the seat of the blow, there was little else in the clinical symptoms to suggest what otherwise might have been regarded as a case of gall-stones, with such complications as are well enough known to accompany their impaction.

Even supposing no serious traumatic lesion had taken place in the deep parts about the region of the gall-bladder and ducts, it is still possible that gall-stones may have been present in the gall-bladder at the time of the accident, and through forcible dislodgement become the source subsequently of the symptoms from which the patient suffered.

At the time, however, of the first operation, I was, rightly or wrongly, lead to believe that the adhesions encountered, being so extensive and so dense, must have owed their origin to traumatism, and not to have been solely the result of inflammatory mischief secondary to impacted gall-stones. If gall-stones were at the bottom of the mischief, the adhesions

were certainly denser and more extensive than any I had previously encountered in operating for this condition. Having explored both the interior of the pylorus and the duodenum, and also examined the canal of that part of the colon involved in the matted mass, and finding that these channels were free and unobstructed, I did not attempt to detach the parts.

I need not follow the history of the case further. Chronic jaundice later set in, with none of the old attacks of pain. Emaciation and weakness slowly increased. If the ducts were becoming, or had become, completely blocked, as I believed by stricture or cicatricial contraction, any attempt to deal with the affected parts was out of the question, for if the separation of the adhesions was not possible at the first operation, I did not think it likely that I should be any more successful in a second attempt. Further, I was not able to entirely remove from my mind the thought that, though the long history of the case did not point to carcinoma at an earlier stage of his trouble, it was not out of the question that his later symptoms owed their manifestation to such a development; and the more possible did this aspect of the case appear, if, after all, gall-stones were at the bottom of the mischief.

There seemed to me, therefore, only one way of attempting to circumvent the difficulty, and that was by establishing a fistulous communication between the dilated bile ducts in the liver and the small intestine. I had as a precedent for such a proceeding a case recorded by Professor Hans Kehr, of Halberstadt, who, in a case of cicatricial contraction of the hepatic duct following,—it is supposed, upon a chronic duodenal ulcer,—succeeded in establishing a communication between the liver and the first part of the duodenum. There was one point of considerable difference in comparing the two cases, which rendered my own one of special difficulty and of doubtful purpose to deal with. While in Kehr's case the liver was moderately enlarged, in mine it was greatly shrunken. The history of the two cases probably accounted for this difference; for in Kehr's the symptoms were only of about a year's duration, in mine they dated back for several years; so that the gland in

the one case had not gone beyond the stage of biliary engorgement and active secreting power; in the other it had reached the stage of atrophy, and probably, therefore, diminished power of secretion. Another point of distinction between the two cases was that, while Kehr was able to unite the duodenum to the liver, I could only secure the jejunum at about from six to eight inches from the duodenojejunal bend; for, as has been already stated, the adhesions were so dense and extensive that I could not distinguish the duodenum.

The deeply situated and atrophied condition of the liver rendered it not possible for me to follow the course adopted by Kehr. He excised a portion of the liver six centimetres long and from two to three broad, and deepened the wound with Paquelin's cautery. I, on the other hand, had only room enough to make a simple incision and enlarge it somewhat with the cautery. It was owing to this incomplete opening into the liver that rendered it impossible for any marked result in the way of permanent drainage of the gall-ducts to take place. For, although there was some darkening of the motions noticed afterwards, it was quite temporary; and there is but little doubt that the wound in the liver healed, thus checking any further outflow of bile, supposing the hepatic cells were not too atrophied to secrete. As the man recovered perfectly well from the operation, it was my intention later to have opened the jejunum on the side opposite to that stitched to the liver, and then attempt to remove a sufficient amount of the hepatic substance to insure of a permanent fistulous communication with the bowel. I saw the patient shortly before leaving for my holidays, but on my return I learned that he had died from gradually increasing exhaustion. Unfortunately, there was no post-mortem, so that the question of calculus or malignant disease must still remain an unsolved question in the case.

The case recorded by Professor Kehr was operated upon on January 8, 1904. Four days after the operation, it was noted that the stools were brown, the urine much clearer, and the icterus less; and on February 6, four weeks after, when

the last note is made, the patient is stated as being much better and putting on weight.

The conception of the operation appears to have arisen with Marcel Baudouin in 1896, and Langenbuch in 1897; but to Kehr belongs the credit of having first successfully put it into execution. Kehr published his case in the *Zentralblatt für Chirurgie* of February 20, 1904, and in his comments upon it points out, what is equally well shown in my case, that the exposure of the raw hepatic surface to the interior of the intestinal canal was not followed by any rise of temperature or other indication of septic disturbance.

It is probable that the operation is one that will be but rarely called for, and then only for such cases where the hepatic or common duct is so inextricably involved in adhesions that they cannot be freed. But whenever its execution may seem desirable, these two cases appear to indicate that it may be safely undertaken without any fear of any immediate or comparatively remote dangerous effects.

VOLVULUS OF THE CÆCUM.

WITH AN ACCOUNT OF RARE AND POSSIBLY COMMON CASES.

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AND

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It is true in the history of a disease that it is often first recognized in its most acute or fatal forms. Later, less acute varieties are found to exist, and it is the study of these milder cases which throws light on the pathology of the more severe and less common condition.

In this communication we deal with fifty-seven cases of cæcal volvulus, and from the study of these comparatively rare and acute cases suggest that we have recognized a far more common and less acute condition. It is to introduce this that we have been led to analyze such cases as we have been able to find in the literature together with some which have fallen under our own notice. For permission to make use of the latter, we have to thank those members of the Staff of St. Thomas's Hospital under whom they were admitted. If we are right, something will have been done to relieve the vermiform appendix of a little of its evil reputation, and perhaps to explain some of those not uncommon cases of recurrent attacks of abdominal pain with fulness and tenderness in the right iliac fossa, constipation, and vomiting, but unaccompanied by fever, which may be brought on by exertion or some other slight cause, and which pass off in the course of a few hours.

We do not lose sight of the fact that in such cases the appendix will probably undergo secondary inflammatory

changes which may at any moment become so acute as to overshadow completely the cæcal condition.

CASE I.—*Volvulus of Cæcum; Resection; Death.*

M. T., a cellar-man, aged forty-six years, was admitted under Mr. Clutton on May 7, 1903. A stone had been removed from the left kidney seven years previously. Habitually somewhat constipated, he was seized rather suddenly, four days before admission, with acute pain in the left inguinal region, which rapidly became diffused over the whole abdomen. He vomited twice on the second day, and once on the third day, but not again. The bowels were opened on the second day, but since that time neither fæces nor flatus had passed. On admission, the abdomen was somewhat rigid, distended, tender, and moving only slightly with respiration. There was a trace of albumen in the urine. The pulse was 60 and the temperature normal. Enemata were given without result. The man did not appear very ill, there was no more vomiting, and the tongue, though furred, was moist. About twelve hours after admission it was decided to operate. The abdomen was opened by a mid-line incision below the umbilicus. The enormously distended cæcum presented and was tapped, a large amount of fluid fæces, containing myriads of thread worms, and a large quantity of gas being evacuated. The twist was from right to left at a point about half-way up the ascending colon, and the involved gut was gangrenous. It was therefore resected, the colic end being closed and a Paul's tube being tied into the ileum. Death took place on the sixth day, and at the autopsy general peritonitis was found.

CASE II.—*Volvulus of Cæcum; Resection; Death.*

R. S., a lighterman, fifty years of age, was admitted under Mr. Clutton on May 2, 1903. He had had no previous attack of abdominal pain. He was taken ill six days before admission; the symptoms progressed gradually, and vomiting had been occasional. On admission, the abdomen was greatly distended, moving badly on respiration, and peristaltic movements could be felt and heard, but not seen. The pulse was 106, regular, and of good volume. Nothing had been passed per rectum since the onset of the illness. The tongue was furred and dry, and the urine slightly albuminous. Considering that the obstruction was of six days' duration, the general condition was not very bad.

The abdomen was opened through the left rectus. The cæcum, enormously distended, occupied the greater part of the abdominal cavity, and was rotated in such a way as to bring the caput cæci to lie against the spleen, the parts involved being the cæcum, ascending colon, and four inches of the ileum. The cæcum was gangrenous and was resected, the colic end being closed, and a Paul's tube being tied into the ileum. The peritoneal cavity was washed with saline solution and the abdomen closed.

Death occurred fourteen hours later. At the autopsy general peritonitis was found.

CASE III.—*Volvulus of the Cæcum; Death.*

M., male, aged forty-five years, was admitted to St. Thomas's Hospital on September 14, 1902. Previously he had suffered from irregular attacks of intestinal obstruction. For a week previous to admission he had suffered from "abdominal trouble," pain, occasional sickness, etc., which had become acute for the last two days. He was a heavy drinker, and had subacute delirium tremens for the four days before admission. The man was obviously very ill. The abdomen was distended, moved upon respiration, was more tender upon palpation than upon percussion; it was resonant all over and held more or less rigid. Under chloroform an incision was made through the lower part of the right rectus abdominis muscle. The sigmoid was found to be collapsed and the small intestines very distended; the cæcum could not be found. The incision was extended upward. In the situation of the stomach was found an enormously and tightly distended viscus, which proved to be the cæcum. It had twisted on itself, and lay in the left hypochondrium in relation to the spleen. The cæcum was delivered and untwisted, when the caput coli was found to be gangrenous in two places. After tapping, the necrotic places were invaginated and a Paul's tube inserted, thus fixing the cæcum in its normal position. The colon now filled up, and it was observed that the ascending colon and the right limb of the transverse colon were close and parallel to each other, being joined by a congenital malformation of the great omentum. The cæcum was free, and it had twisted on the "fixed" point of the abnormal mesentery. The congenital mesentery was divided and the abdomen closed. There was much shock, and the patient died in twenty-four hours.

Post-mortem by Dr. Harold Singer. "The abdomen only

was examined. The tip of the cæcum had been brought outside and a Paul's tube inserted. The wound looked healthy. No peritonitis. The cæcum was empty but much dilated, and the intestines above were also distended. The transverse colon and parts below the cæcum were practically empty. There was no mark on the bowel at the place where the twist had occurred (as was noticed at the operation)."

The abnormality of the mesentery is described thus:

"The mesentery of the small intestine was attached as usual. The cæcum was provided with a very long mesentery, which was not attached to the right iliac fossa, nor along the normal course of the ascending colon, but passed directly upward to the transverse colon to become attached near the middle line. Part of this had been divided on the left of the cæcum at the operation. Consequently, it and ascending colon were now extremely movable, though the latter had been more fixed at the time of the operation." The obstruction was at the hepatic flexure and due to the sharp bending forming a spur, and so a valve which was firmly closed by the distention of the cæcum.

CASE IV.—*Acute Volvulus of the Cæcum; Death.*

W. H., male, aged twenty-nine years, was admitted to St. Thomas's Hospital, September 5, 1902, under the care of Mr. F. C. Abbott. The abdomen had been opened, but, owing to the difficulty of finding the whereabouts of strictures, a Paul's tube only was inserted, the man's condition allowing of no prolonged search. The following are notes of the post-mortem examination:

"The abdomen had been opened through the right rectus. The intestines were adherent to the scar and matted together. This peritonitis was local. In the middle line, immediately below the costal angle, the enormously dilated and nearly empty cæcum was found lying immediately beneath the wound. The cæcum passed downward and slightly to the right, and then the ascending colon passed *behind the mesentery of the small intestine*, upward and towards the left. The transverse colon was small and close to the spleen, lying to the left of the stomach. The gut then passed down the left side to the sigmoid. The cæcum had a long mesentery and the ascending colon none at all. The transverse mesocolon and the great omentum were on the left side of the abdomen, being curled up just below the spleen. The mesentery

of the small intestine was unusually long, and a firm band crossed the ascending colon when the cæcum was displaced upward.

At the operation the cæcum had been found in the left hypochondrium in relation to the spleen.

CASE V.—*Ileocolic-colic Intussusception; Secondary Obstruction, due to a Congenital Malformation of the Mesentery with Volvulus and Axial Rotation of the Cæcum, Ascending and Transverse Colons.*

L. B., aged ten months, was admitted under Dr. Box for intussusception. At the operation a double intussusception was found and reduced. Death occurred about forty-five hours after the operation. The autopsy was made by Dr. Singer, of Omaha, U.S.A., from whose report the following is an abstract:

"On opening the abdomen, a coil of large intestine stood out prominently on the left side; it then curved upward and to the right, then backward and to the right behind the coils of small intestine. The great omentum could not at first be seen, but was found curled up, lying above the transverse colon, which was turned over so that its posterior surface looked to the front. The cæcum and the ascending colon were provided with an extremely long mesentery, and the former had passed behind the small intestine upward and to the left, so that it was lying a short distance from the spleen. It had made a half-twist in getting into this position, but was not completely obstructed. The cæcum, ascending colon, and the transverse colon were distended, whilst the sigmoid and rectum were very small, and had no mesentery at all. There was no absolute cause of obstruction to be seen. There was no peritonitis or other sign of disease."

It is scarcely necessary to add that the above cannot represent the position in which the viscera were put at the operation.

The following is a brief analysis of all the cases which we have been able to consult. The total number examined was fifty-seven, of which forty-two were males, thirteen females, and in two the sex was unstated. It would thus appear that volvulus of the cæcum is three times more frequent in men than women.

With respect to age, volvulus of the cæcum has been described in every decade up to 80 years of age. The youngest

subject was nineteen days, the next one ten months, the oldest was over 70. Under 5 years, 3 cases; 5 to 10 years, 1 case; 10 to 20 years, 7 cases; 20 to 30 years, 15 cases; 30 to 40 years, 14 cases; 40 to 50 years, 7 cases; 50 to 60 years, 4 cases; 60 to 70 years, 2 cases; 70 to 80 years, 1 case. Described as "adult," 1 case; age unstated, 2 cases.

Just over half the cases are found between the ages of 20 and 40.

It has long been taught that volvulus is one of the most acute of all the forms of intestinal obstruction. So far as the cæcum is concerned, the clinical history of the cases under consideration is in contradiction to this teaching, especially when it is remembered that many of the patients have previously had and recovered from definite attacks of subacute intestinal obstruction. By means of tabulating the length of the illness in the cases of volvulus of the cæcum, the fallacy becomes at once apparent.

Under 24 hours, 7 cases; 1 to 2 days, 2 cases; 2 to 3 days, 6 cases; 3 to 4 days, 6 cases; 4 to 5 days, 4 cases; 5 to 6 days, 4 cases; 6 to 7 days, 1 case; 8 to 14 days, 10 cases; 15 to 21 days, 3 cases. Unstated, 10 cases; described as "chronic," 4 cases; or, up to 1 week, 30 cases; 1 to 2 weeks, 10 cases; 2 to 3 weeks, 3 cases.

From the above it can be seen that acute, subacute, and chronic varieties exist. Moreover, a number of the cases had suffered premonitory attacks of abdominal pain, and vomiting; the last attack only differing in degree from the previous ones.

Although figures giving the ratio of cases which are cured to those which die are most misleading, we may state that of the fifty-seven, nineteen were operated on and recovered, whilst the other thirty-eight died, of whom twenty-one were operated upon. The total mortality would therefore appear to be 66 per cent., whilst the mortality after operation works out at 52.5 per cent.

The Position of the Displaced Cæcum.—The cæcum has been found in every region of the abdomen, and has even formed a volvulus outside the abdomen, viz., in the sac of an

inguinal hernia. In this connection it may be remarked that the cæcum is frequently found in the strangulated or obstructed right inguinal herniæ of children, and when distended with gas is almost always twisted. In the thirty-three instances in which its position is noted, it has been found in the right lumbar region in 1 case; right hypochondrium, 1 case; epigastrium, 4 cases; left hypochondrium, 13 cases; left lumbar region, 6 cases; left iliac region, 1 case; umbilical region, 2 cases; pelvis, 4 cases; in a right scrotal hernia, 1 case.

Thus the left hypochondrium is by far the most frequent situation. Here it is in relation with the spleen and stomach, lying beneath the great omentum, which is often displaced upward and to the left. Next in order of frequency comes the left lumbar region, followed by the epigastric and pelvic.

Anatomical Varieties.—We have attempted to construct a concise classification of the different anatomical varieties found.

1. In the first variety there is a mesentery common to the whole of the small intestine, the cæcum, and a varying length of the colon. The root of the mesentery is in consequence much smaller and less widely spread; for practical purposes, its axis may be looked upon as that of the superior mesenteric vessels. It is round these vessels that the rotation takes place.

2. The second variety is derived from the first, the root of the mesentery in these cases, instead of being more or less localized to the origin of the superior mesenteric artery, extends, to a lesser degree than normal, towards the right iliac fossa. In this way the mesentery of the lower part of the ileum is relatively shorter than that of the rest of the small intestine or the cæcum, and offers a more or less fixed point for the latter to rotate upon.

This is the most common variety of cæcal volvulus, and is found chiefly between twenty and forty years of age.

In the first variety the rotation is practically about one fixed point, so that the arc of movement described by the cæcum is the segment of a *circle*. In the second variety there are two fixed points, and the curve of cæcal rotation is a segment of an *ellipse*. Mathematically, these figures merge into

each other; so, surgically, there is every intermediate pathological form.

3. The third variety is one of rotation of the cæcum along its long axis. It is always present with the two former varieties, but may exist alone. Again, it is present in the pelvic cases, and may complicate what is merely an elongation of the caput coli.

The first and second varieties are always grafted upon some predisposing congenital abnormality of the mesentery. The third may also be grafted on a congenital malformation of the cæcum or its mesentery. But the fœtal cæcum is tapering in form, whilst those which undergo axial rotation are pouched. As the pouches are an acquired feature, this must be a purely acquired variety.

As the ileocæcal valve represents the boundary between the small intestine, which is adapted for the propulsion of liquid contents, and the large, which is modified for the passage of solids, it is in the cæcum that the products of digestion rest or pause, in order that this change of consistence may take place, a change which is effected by the absorption of moisture and the deposition of mucus. This stasis in the cæcum soon leads to its enlargement and the formation of pouches between its longitudinal bands. The consequent fermentation and gas production by the micro-organisms increase the condition. Hence there can be an acquired excessive enlargement of the cæcum which needs only some mechanical force, such as the contraction of the abdominal muscles, or even gas distention, to convert it into an axial rotation.

This point is more fully gone into in the Erasmus Wilson Lectures of 1904 and also by T. R. Elliott, *Journal of Anatomy and Physiology*, May, 1904.

We do not pretend that this simple classification includes all cases, but suggest that from these three fundamental varieties more complex forms may arise as modifications.

Our classification may therefore be summarized as follows:

1. Circular rotation; that is about one fixed point. 2.

Elliptical rotation; that is about two fixed points. 3. Axial rotation; that is about the longitudinal axis.

(a) Congenital. (b) Acquired.

It is to this acquired form of cæcal rotation that we specially wish to direct attention, and for this purpose we have analyzed the recorded cases. All the congenital forms are rare, or at least uncommon, but we believe the acquired to be neither rare nor uncommon; and it is the object of our paper to emphasize this belief. But before proceeding to deal with the case which best supports our contention, we shall refer to various points which may be gleaned from the histories of those already recorded.

Remarks upon the Previous Histories of the Recorded Cases.—Those instances in which the history is simply that of ordinary acute intestinal obstruction call for no special comment. But when we examine the records carefully, scanty though they are in most instances, we find that a considerable proportion give accounts of previous and recurrent attacks of abdominal trouble, or even of definite intestinal obstruction, which have passed off. Such attacks vary in length of time from a few minutes to several days. Some patients have been subject to them for months or years, whilst in others the premonitory attacks have preceded the final acute one by only a few days or weeks. The most constant symptom is abdominal pain, which may merely amount to discomfort, or may be intensely severe. The most frequent concomitants are vomiting and inaction of the bowels as regards both flatus and fæces. The abdomen may rapidly become distended with gas, which in some instances forms a recognizable resonant tumor. With the passage of flatus the attack may rapidly and completely subside. Possibly the increasing intracæcal gas pressure reduces the displacement of the cæcum which gives rise to the attack.

Two of the cases recorded by Fagge many years ago illustrate these points very well. One was a female aged forty-five years, with a marked history of constipation. A few days after

admission she began to suffer from symptoms of intestinal obstruction, not of an urgent nature. On two or three occasions there were slight faecal evacuations which gave relief. Vomiting was present, but irregular, and all the symptoms varied from time to time. At times an indefinite tumor could be felt just to the left of the umbilicus. Death ultimately occurred from perforative peritonitis, and at the autopsy there was found a greatly distended cæcum and ascending colon rotated on its longitudinal axis.

The other case is still more striking. It is that of a man aged twenty-two years, who had had two definite attacks of abdominal pain and vomiting,—one six months, and the other three months before admission. A few days after being admitted he had a third and similar attack; and subsequently others of a like nature. The last ended fatally, after a residence of four months in the hospital. At the autopsy the displaced cæcum was found in the left loin, and death was due to perforative peritonitis.

Case of Chronic Constipation, Dilatation of the Cæcum, with Attacks of Axial Rotation and Prolapse into the Pelvis; Consequent Subacute Appendicitis.—P., female, aged thirty-eight years; had recovered from a previous attack of phthisis. For many years she had suffered from constipation, which was associated with abdominal discomfort, the passage of mucus, and tenderness along the course of the colon. For the last year this pain and discomfort had been particularly localized to the right iliac fossa, making more or less of an invalid of her. There had never been a definite attack of appendicitis with elevation of temperature. The pain presented the following marked peculiarities. It was brought on by the action of purgatives, also by any action of the bowels, much less noticeably by that of the bladder, by exercise and any straining. The character of the pain was difficult to describe, and varied in intensity from a kind of pelvic discomfort to definite pain referred to the umbilical region. There were also disturbances of digestion and all the accompanying symptoms of nervousness, etc.

Examination of the abdomen revealed only tenderness on palpation over the right iliac fossa, and the appendix could be distinctly felt as a firm, thick cord, freely movable and low down on the brim of the pelvis. No pelvic examination was made. After this consultation the patient went home, and had much

pain in consequence of the handling which she had had. This attack lasted some hours. The diagnosis made was that of sub-acute appendicitis, secondary to chronic constipation and fermentation in the cæcum.

At the operation, after the abdomen was opened, it was found impossible to deliver the cæcum by ordinary means; and on exploring with the finger it was found as a tense gas-containing cyst, more or less impacted in the pelvis. By passing the fingers round, it was easily freed and delivered. The cæcum was very large and pouched. The appendix was clamped and removed. The stump was sutured into the cæcum, and the stitching continued up between the anterior and external muscular bands, so as to gain two objects. The first is that by invaginating the external pouch the cæcum was tilted and prevented from again prolapsing into the pelvis; the second, that by typhloplication, the cæcum was reduced in size, a condition which would tend to limit faecal stagnation within it. The condition of the appendix was simply one of a slight degree of chronic catarrh. The wound healed by first intention.

Since the operation, the pain following exercise and purgation has disappeared. Two months later, she was reported as being very much better and free from almost all her previous troubles.

In the first place, the cæcum was perfectly free to rotate. The clinical history agrees with those obtained from cases proved to be volvulus of cæcum, and dealt with in the early part of the paper. The attacks were produced by exercise, violent movements of the diaphragm, straining, evacuations of the bowels, the action of purgatives; all of which could lead to cæcal rotation on its axis. The attacks varied both in duration and intensity. After a purgative it would last for "some hours," and unaccompanied by any rise of temperature. This duration is too short for any inflammatory attack. One is, therefore, forced to look for some physical condition. We believe that the explanation is to be found in some axial rotation of the cæcum, which imperfectly occludes the lumen of the ascending colon or ileum; the acquired dilated condition

of the cæcum (typhlectasis) being the predisposing condition, and the subacute inflammatory condition of the appendix being only an incident consequent upon the cæcal condition.

Further, a case recorded by Mr. G. H. Makins, in the *Lancet*, January 18, 1904, which may be quoted as an example of acute axial rotation of the cæcum which was impacted in the pelvis, exemplifies merely a superlative degree of the same condition seen in our case. In this instance there had been four or five distinct attacks of abdominal pain and vomiting over a period of eighteen months. There had been abdominal pain for ten days and complete obstruction for six. On opening the abdomen the displaced and distended cæcum was found to be so firmly impacted in the pelvis that it could not be delivered until some of the gas had been let out with a trocar. The patient made an uninterrupted recovery.

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AN OPERATION FOR INGUINAL HERNIA.

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THE accompanying drawings have been made for me from studies of the anatomical findings at operations for hernia during the past few months. These drawings illustrate my interpretation of the essential details of Bassini's operation for inguinal hernia.

In all ordinary cases of inguinal hernia, I have found this method of exposure and suture of the hernial sac and the method here described of repair of the abdominal wall satisfactory. I have never yet found it necessary or advisable to excise the veins of the cord. I have occasionally in children not transplanted the cord, and under certain conditions have not transplanted it in adults. It seems to me of comparatively little importance whether the cord is or is not transplanted. I am more and more inclined not to transplant it. I have utilized the fascia of the rectus abdominis a few times to reinforce the abdominal wall above the inner end of Poupart's ligament, as illustrated by Halstead. The elaborate method of suture used by Halstead seems to me, excepting in unusual cases, unnecessary. The simple suture described here is efficient in all ordinary cases of inguinal hernia.

The patient is in bed two weeks, on a bed-rest the third week, and out of bed the fourth week. A bandage is worn for one month, after being up and about, for the comfort it affords. The operation is as follows:

An oblique incision is made sufficient in length to expose readily the situation of the internal and the external abdominal rings. The few bleeding vessels are clamped and immediately ligated. The external abdominal ring is exactly developed by a few strokes of the knife and blunt dissection. (Fig. 1.)

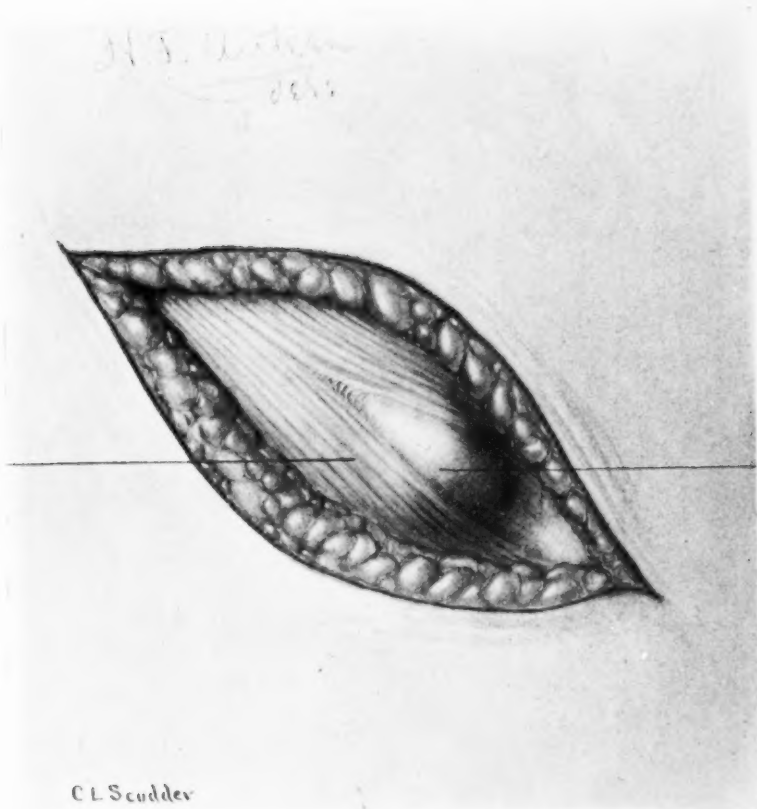


FIG. 1.—Oblique incision through skin and superficial fascia down to the fascia of the external oblique muscle. Note the external abdominal ring made apparent by slight bulging caused by full hernial sac.

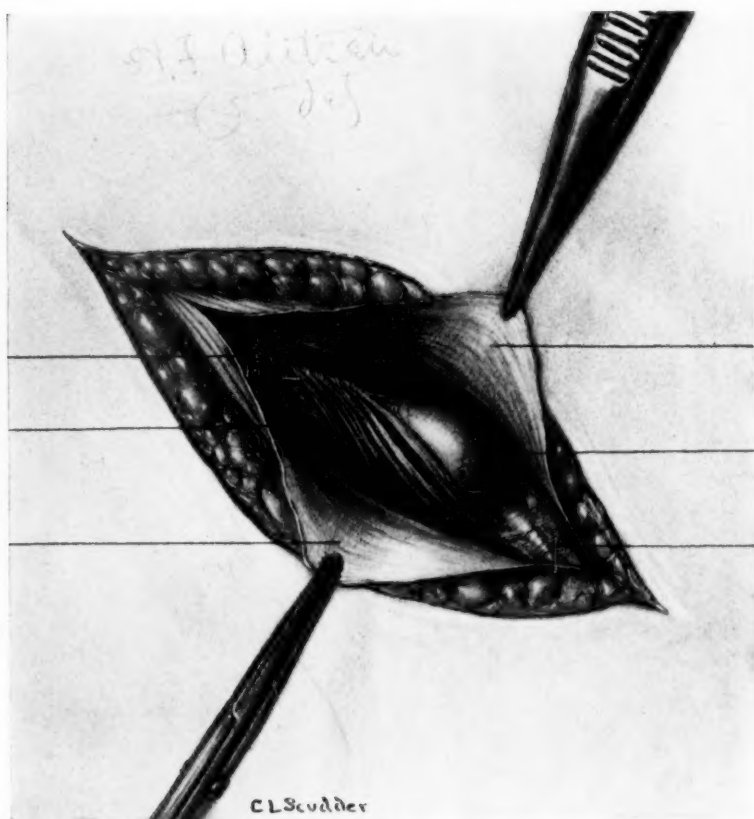


FIG. 2.—Oblique incision in line of fibres of the external oblique fascia. External oblique fascia freed from parts beneath. Note fibres above of internal oblique, conjoined tendon, below well-developed cremasteric fibres, bulging sac of hernia, cord showing at inner angle of wound.

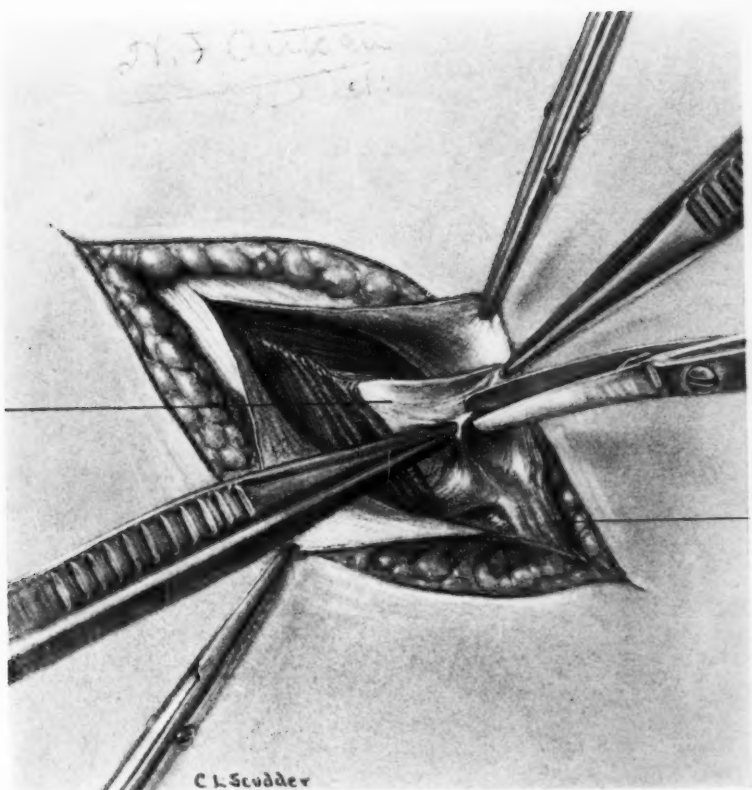


FIG. 3.—The sac of the hernia has been isolated sufficiently and raised by forceps. Note scissors opening the sac, cord in lower angle of wound.

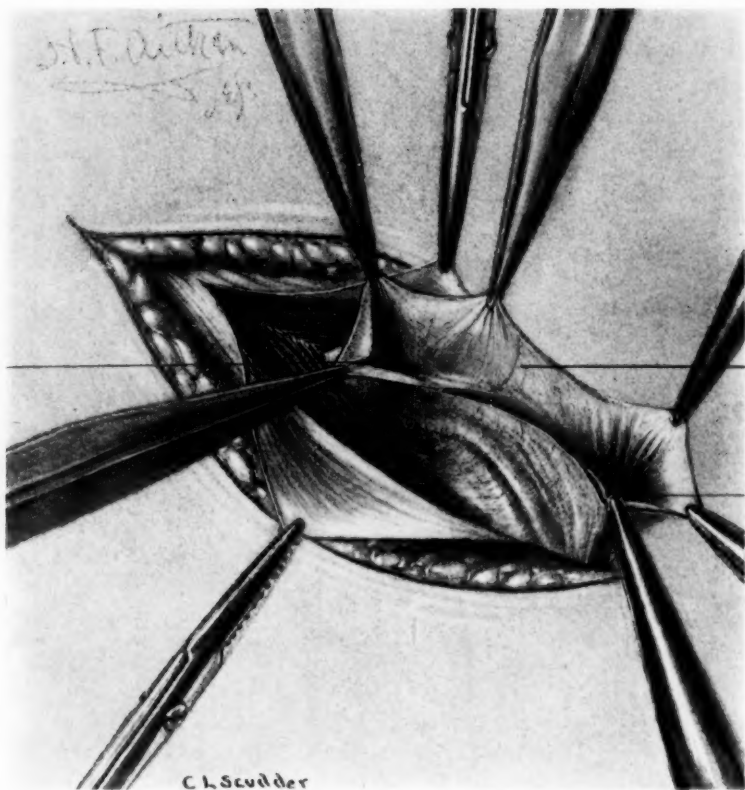


FIG. 4.—The sac of the hernia has been opened. Note the interior of the sac leading towards peritoneal cavity above and to the scrotum below. Note the cord posteriorly to the sac and the dotted line across the sac indicating the line of section for further isolation of the peritoneum.

The external oblique fascia is divided parallel with its fibres and freed by blunt gauze dissection from the parts beneath for about two fingers' breadths from the cut edges. The lower border of the internal oblique muscle, the sac of the hernia, the cord covered in part by the cremaster muscle and fascia are thus exposed to view. (Fig. 2.) The cremaster muscle may be well developed, as is indicated in the drawing, or it may be poorly developed and appear as a thin fascia with a few muscular fibres scattered through it. When the muscle is well developed, it may be utilized in closing the abdominal wound, as is here illustrated.

The cremaster is split parallel to its fibres and separated from off the sac and cord, and the sac developed by blunt dissection with fingers and gauze. The sac is thus more clearly exposed to view. The sac is held by dissecting forceps and opened by knife or scissors. (Fig. 3.) The sac is emptied of its contents. This step is facilitated by the Trendelenburg position, complete anæsthesia of the patient, and a gauze sponge thrust into the sac and cautiously withdrawn. If any intra-abdominal organ (intestine, omentum) is found adherent to the interior of the hernial sac, it should be carefully freed and all bleeding checked.

The sac is divided transversely down to the cord and its vessels. The line of posterior division of the sac over the cord is indicated in Fig. 4. After dividing the peritoneum, the separation of cord from sac is very greatly facilitated by blunt sponge dissection. The proximal part of the sac is isolated (*a*) from the cord and (*b*) from the abdominal muscles (the internal oblique, conjoined tendon) in order to facilitate the placing of the peritoneal suture. It is important to make the isolation of the neck of the sac complete in its whole circumference, so that the subsequent suture will be an effectively placed one.

The commonly used purse-string suture, even if applied with transfixion of the neck of the sac, may slip. This occurred to me some years ago. It fortunately happened before the outer wound was closed, so that a secure suture was immediately

placed. Since that time I have used the suture illustrated in Fig. 6. When the sac is very thin walled, a purse-string suture securely applied will serve every purpose. The distal portion of the sac (the scrotal part), if such exists (Fig. 5), I have ordinarily disregarded, except to curette gently or to wipe over its inner surface with gauze. It is unnecessary to remove it in most cases. If it is thick and extensive, it is well to excise it. If it is left *in situ*, no suture is taken in its mouth. The cavity of this sac is probably completely obliterated. I have never seen a hydrocele or cyst follow this method of treating the undissected distal portion of the hernial sac.

Traction downward upon the proximal portion of the hernial sac and retraction of the tissues (internal oblique, cremaster, etc.) at the upper angle of the wound, together with traction downward upon the cord, facilitate suturing the peritoneum (Fig. 6). I have used the continuous loop or hemstitching suture taken with chromic gut and a curved needle. (Fig. 6.)

The cord and distal portion of the sac are now lifted by blunt dissection from their bed, if it is decided to transplant the cord, and are together held aloft by retractors. (Fig. 7.)

The next sutures are placed as indicated in Fig. 7. It is well to avoid including within the suture the nerve in the lower border of the internal oblique. I always place one or two sutures external to the spot where the cord comes through the peritoneum (Fig. 7) and superficial to the suture of the neck of the sac. These two sutures preclude the possibility of a recurrence of the hernia at this particular place. The remaining sutures are placed so as to lie beneath the uplifted cord. These interrupted sutures include the lower border of the internal oblique and conjoined tendon, the cremaster muscle and fascia, and Poupart's ligament. (Fig. 7.) The sutures are tied securely without constricting the muscular tissues. (Fig. 8.)

The cord is placed upon the tissues approximated by this series of sutures, and the external oblique fascia is closed over the cord by a continuous chromic catgut suture, taken as illustrated in the drawing (Fig. 9), with a loop or hemstitch. The

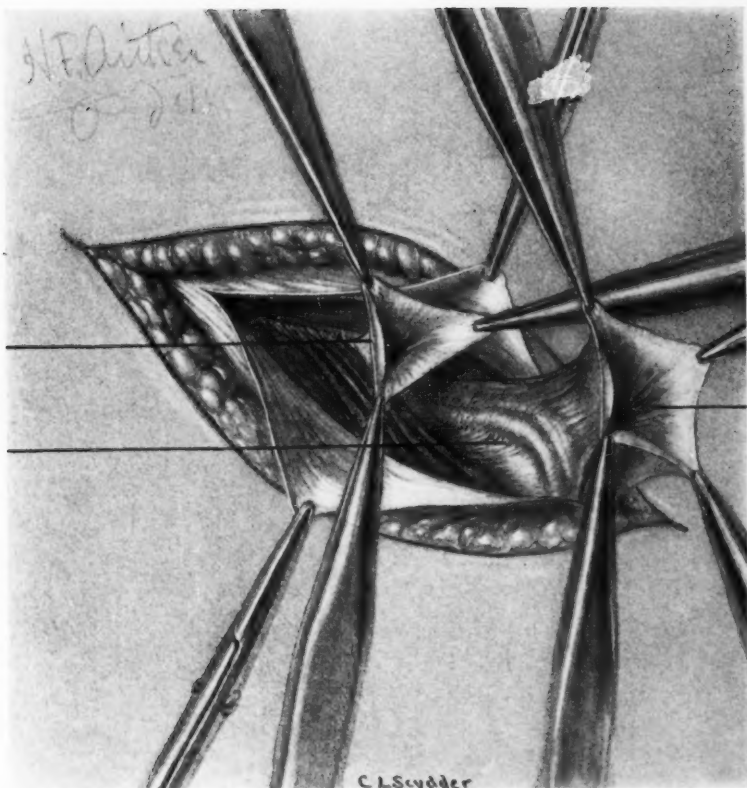


FIG. 5.—The peritoneal portion of the hernial sac has been completely isolated; likewise the scrotal portion. Traction towards the symphysis pubis upon the peritoneal upper part of the sac facilitates proper placing of the sutures.

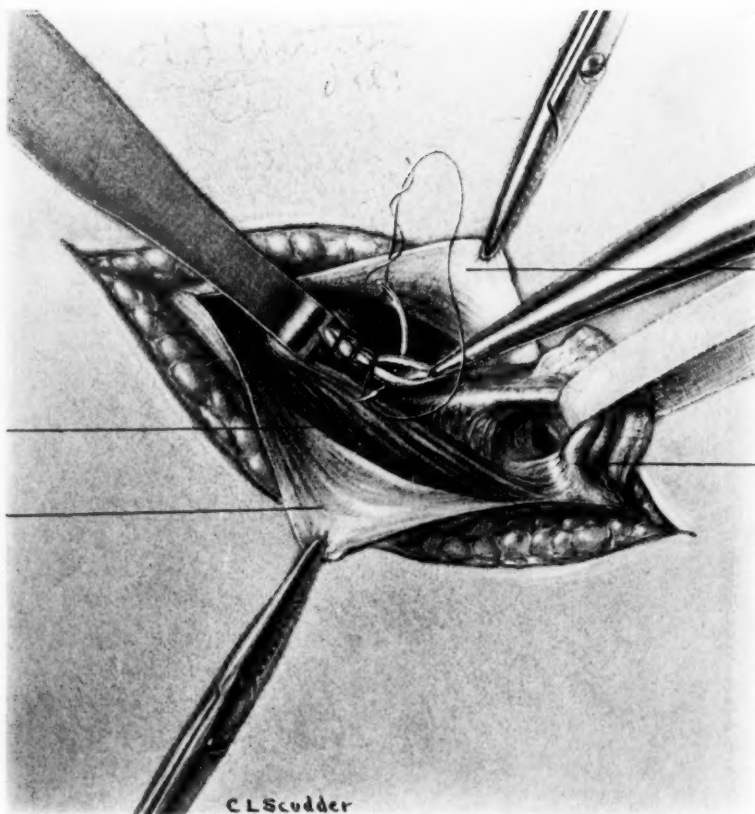


FIG. 6.—The suture is being taken through and across the neck of the sac. Note retractor keeping internal ring region well in view. Note lifting of cord by gauze-tape.

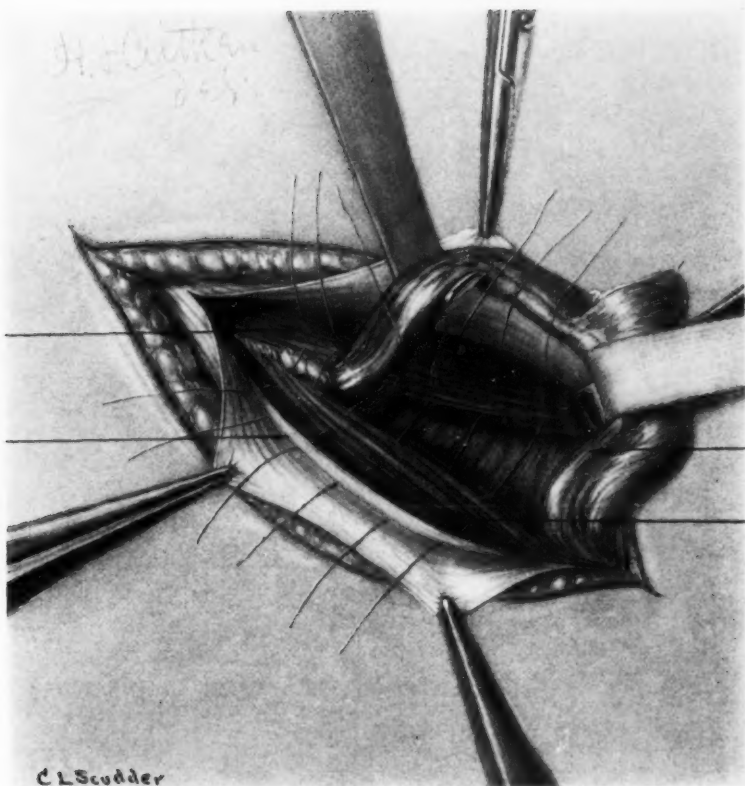


FIG. 7.—Cord well raised, with all cord structures, from inguinal canal. Note suture placed beneath cord passing through conjoint tendon cremaster and Poupart's ligament. Note separation of inner part of divided fascia of external oblique.

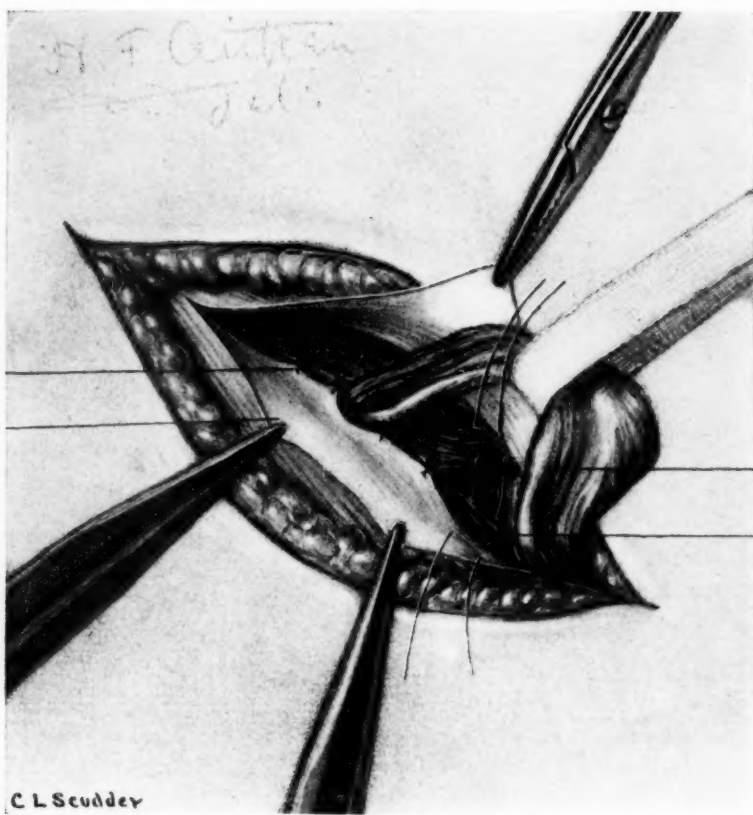


FIG. 8.—Sutures above and below the cord tied excepting two.

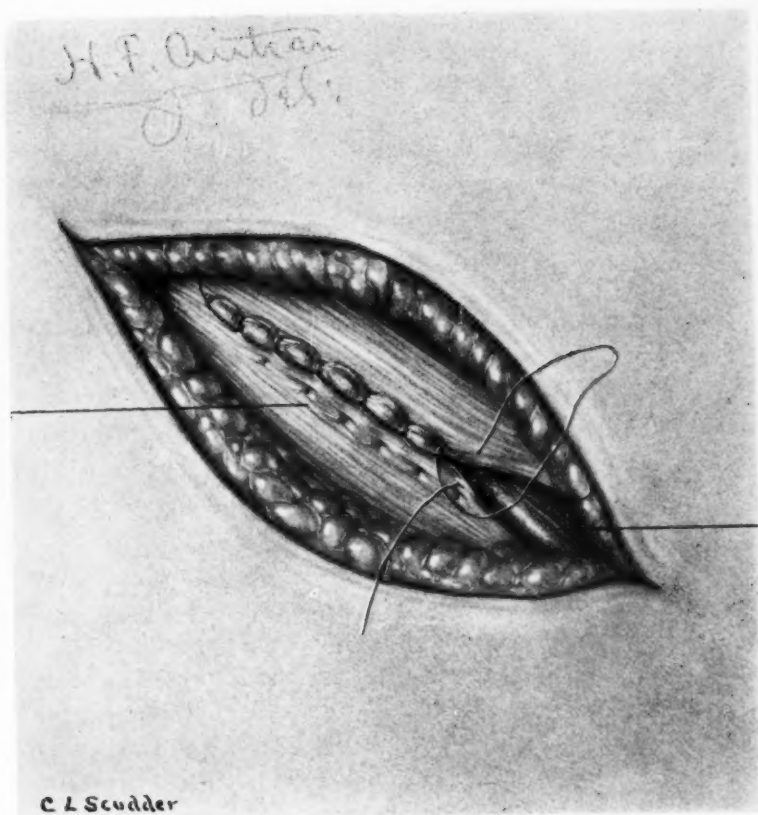
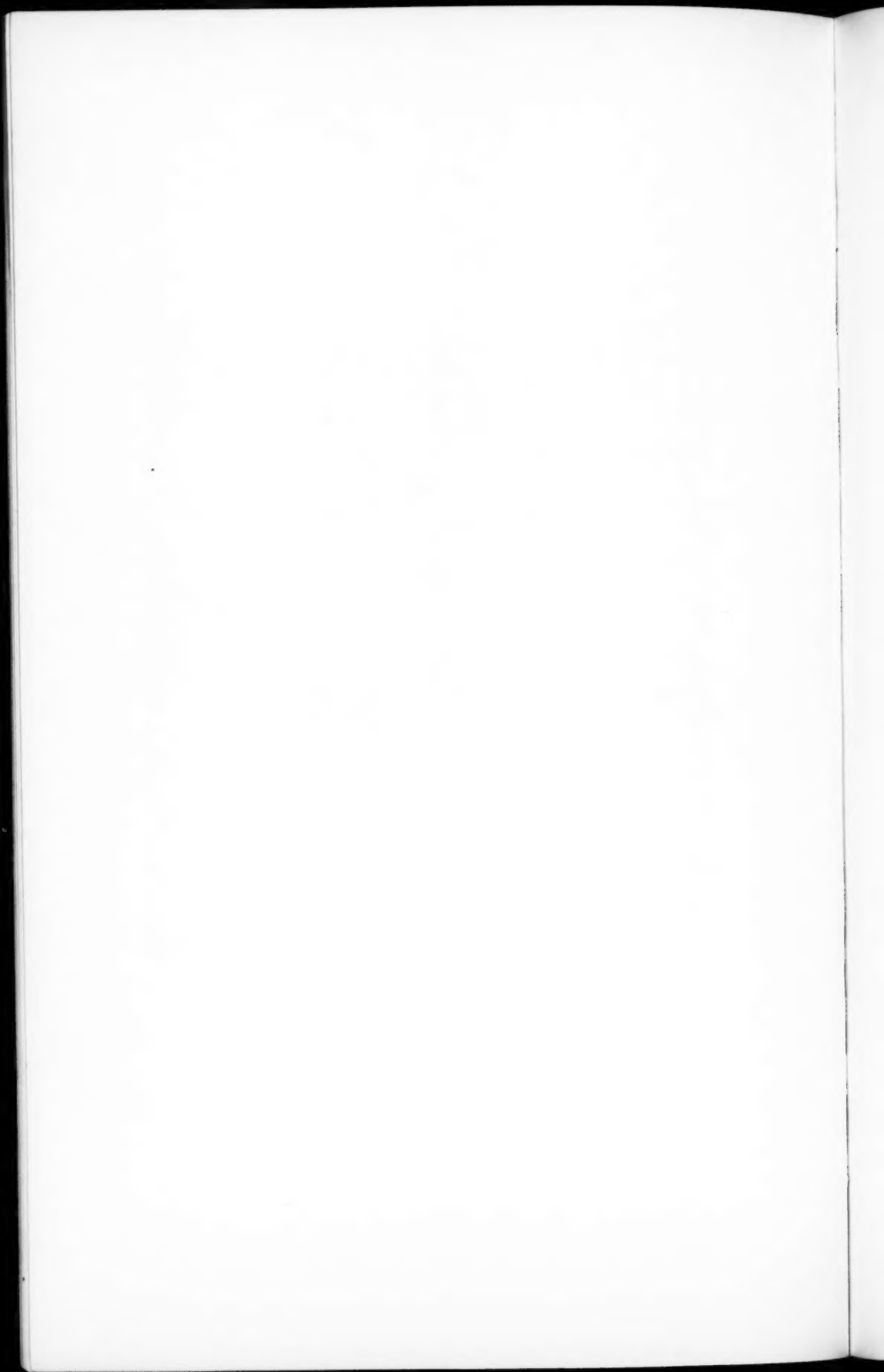


FIG. 9.—Suture of the external oblique fascia above the cord.



fascia is thus not only approximated, but there is a definite overlapping or coaptation of the two layers of fascia as by the mattress suture. Mayo has called attention to the security of the mattress suture taken transversely in umbilical hernia, and Halstead to the firmness of a wound closed by the mattress suture in cases of inguinal hernia.

The superficial fasciæ are next approximated, and with them the subcutaneous fat tissue, by interrupted or continuous fine chromic catgut sutures. The skin is closed by silkworm gut, either cutaneously or subcutaneously placed. All blood and moisture are carefully wiped from the suture creases and skin. A dry sterile gauze dressing fastened with collodion is applied.

I think no especial dressing of a wound of the kind described above has any advantages over the simple dry sterile gauze. I have used, and have seen used, silver foil, ointments, pastes, and powders. I have seen no advantages over the dry gauze dressing. I think that the two factors, other things being equal, which assist or favor the healing of a hernial wound are absolute hæmostasis and a minimum of trauma (by traction), to the skin edges of the wound. Trauma to the skin may be avoided by an ample cutaneous incision.

So important is absolute hæmostasis, that I not only ligate every tiny bleeding point in the wound, but I apply a ham splint to the leg of the operated side, that the spica bandage applied to hold the dressing may exert a maximum of pressure upon the wound during the first twelve or twenty-four hours. The splint is then removed. There is no pressure exerted upon the region of the groin by a spica bandage if the patient is permitted to flex the knee of the bandaged side. A broad band of adhesive plaster is used by some operators to secure the dressing and maintain pressure. Adhesive plaster is dirty, disagreeable, and ordinarily ineffective.

In enumerating the facts which seem to me important in the operation for the cure of an inguinal hernia, I would include the following: An ample cutaneous incision; absolute

hæmostasis; an anatomical dissection of the parts concerned, so that every structure is clearly recognized; the complete isolation of the neck or abdominal portion of the sac; the complete emptying of the sac of both adherent and non-adherent contents; the suture of the hernial sac at the level of the peritoneum of the anterior abdominal wall; the exact suture of the abdominal wall superficial to the peritoneal sutures, including always one or two sutures placed over and above the sutured sac; the minimum of trauma to the cord. I have had a slight recurrence on one side in the case of a very stout "baggage-man" who had a double inguinal hernia. The recurrence was on one side only. In this case I tied the sac's neck with a purse-string suture, and I included within the purse-string extraperitoneal fat tissue. As this fat tissue atrophied from pressure of the ligature, the ligature became loosened, and it is to this fact that I attributed the recurrence. About two years after the operation for the recurrence, there had been no further difficulty with the hernia. This man was killed in a railroad accident. I found at autopsy upon examination of the hernial wounds that the abdominal wall was intact.

LUYS'S INSTRUMENT FOR THE INTRAVESICAL SEPARATION OF THE TWO URINES.¹

BY FRANK P. VALE, M.D.,

OF WASHINGTON, D. C.

FROM the earliest times the urine has been studied with increasing success as an index of disease; but it is only in the last twenty-five years, since the development of renal surgery, that the necessity for an examination of the separate urine from each kidney has arisen, as an aid to a more exact diagnosis, and more accurate appreciation of the functional capacity of each organ. The older methods of meeting this requirement are of interest, and aid in a better understanding of our subject.

Tuchmann, a German physician practising in London in 1874, was apparently the first to emphasize the value of thus separating the urines and the insufficiency of the methods theretofore in vogue in differentiating various surgical affections of the kidney; for example, he said, in determining the source of a hæmaturia or a pyuria, or distinguishing between kidney colic and impaction of a stone. He employed a modified lithotrite with a short right-angled beak, between the blades of which he compressed one ureteral orifice; the bladder urine collected during the time of compression representing the secretion of the opposite kidney. In its use he was guided to the mouth of the ureter by the smooth surface of the trigone, which could not be pinched up, and by the ligamentum interuretericum, which he had found, after a study of the bladder in fifty cadavers, was so prominent as to be felt like a cord when the instrument passed over it, even imparting to the hand a slight vibration. In his first paper he reported the use of the instrument in eight

¹ Read before the Medical Society of the District of Columbia, October 19, 1904.

patients, mostly males, and also experiments with it on himself.¹

Gustav Simon a few months later criticised this method of Tuchmann, and demonstrated it was quite possible to directly catheterize the ureters. This he had accomplished seventeen times on fifteen patients, and was convinced the procedure was easy in the majority. He dilated the urethra under chloroform narcosis, introduced the index-finger, and was guided to the ureteral orifices, which themselves cannot be felt, by the inter-ureteric ligament and the lateral elevations formed by the muscle fasciculi of the ureters which are prolonged towards the bladder, which he said he could readily recognize. Later, Simon took as a guide the orifice of the uterus, which was readily distinguishable through the vesical wall, the mouth of the ureter being found three-fourths to one centimetre outside the commissure of the lips of the cervix and one-fourth of a centimetre in front of it.² He objected to the method of Tuchmann, first, because of the difficult orientation of the bladder at the end of such a long instrument, and, second, because of the short time the ureter could be compressed. His clinic in Heidelberg was visited by Tuchmann, and each demonstrated to the other his method.

Thus in the very beginning of urinary separation a discussion was precipitated as to the relative value of direct ureteral catheterization and indirect intravesical separation. The difficulty of the former was the first objection urged against it. It was out of the question, except in females. Winkle found it impossible either on the living or cadaver.³ Tuchmann objected to it because chloroform narcosis was necessary, and he regarded the separation as incomplete on account of the flow of urine alongside the catheter and into the bladder, if the bladder urine was accepted as the secretion of the other kidney.

Following Tuchmann and Simon, the subject was taken up the next year by Grünfeld.⁴ One of his assistants, Stein, had employed two years before the endoscopic tubes of Desormeaux in examining the bladder in both males and females.⁵ Grünfeld was the first to catheterize the ureters by the aid of

vision. He filled the bladder with water and employed straight, short, endoscopic tubes with a glass window at the distal extremity, the source of light being outside the bladder. He described minutely at what angle to turn the endoscope with reference to the median line of the subject and the depth to which it was to be pushed into the bladder to find the ureteral orifices, thus anticipating Kelly nearly twenty years.

Pawlik⁶ improved the method of Simon by introducing the metal ureteral catheter through the undilated urethra. With the woman in the knee-chest position and posterior vaginal wall retracted, the position of the catheter could be noted through the anterior vaginal wall, and was guided to the ureteral orifices by the prominence, there to be noted, of the interureteric ligament and the cord-like elevation of the ureters. He had thus sounded thirteen patients at the time of his first paper. "It is natural," he writes, "that in an opening so small one does not succeed at once; ordinarily, however, one succeeds quite rapidly." Later, he catheterized simply by means of the finger in the vagina to guide the catheter.

Warnots⁷ seems to have been the only other surgeon to succeed with the method of Pawlik. His efforts on the cadaver in imitating Simon were so discouraging he did not attempt it on the living. Following Pawlik, however, he was more successful, and in each of two women catheterized one ureter in about twenty minutes.

The work of Newmann seems to have been generally overlooked, probably because it is buried in a thesis on malpositions of the kidney submitted to the University of Glasgow in 1883 for the degree of M. D.⁸ He dilated the bladder in the female with eight ounces of boracic acid solution, and took a step in advance of Grünfeld by introducing into the bladder a small electric light, on a long stem. The ureteral catheter was next introduced, and then a cone-shaped speculum with a glass end. He evidently used this method successfully in his practice.

Recognizing the difficulties of ureteral catheterization, which was confined to the hands of a very few, and even with them limited in use to the female, Silbermann⁹ reverted to the

method of Tuchmann, and devised a very clever instrument for compressing the ureteral orifice, which, however, like its prototype, was seemingly never used except by its originator. His idea was to imitate nature and close the ureteral orifice as by an artificial tumor, having had a patient with a fibroid tumor of the bladder set squarely in front of one ureteral orifice. To this end he concealed in a No. 18 (Charrière) catheter a small rubber balloon, which was made to protrude, when within the bladder, by filling with mercury, the weight of which compressed the ureteral orifice when directed over it. He had used the instrument twenty-seven times in fifteen patients, but could not attest the accuracy of the separation because none of the patients suffered from a unilateral affection of the kidneys.

Thus far efforts at catheterization of the ureters had been confined to the female. In anticipation of a case in the male which might imperatively demand catheterization, Harrison¹⁰ in 1884 investigated its possibility, on the cadaver, through the lateral lithotomy incision, but found it necessary in addition, in order to bring the ureteral orifices into view, to open the abdomen in the median line and make pressure on the fundus of the bladder.

With the mention of Hurry Fenwick's "Urinary Aspirator,"¹¹ I have about completed an enumeration of the earlier steps which have led up to our present methods in separating the two urines. "The aspirator consisted of an elastic ball and an oval glass bottle, which could be affixed to the end of a specially curved catheter, which latter was furnished with an elongated laterally placed eye. Later, the catheter was double channelled so that the urine from the disengaged ureter might enter and drain into a different receptacle." Apparently only very small quantities were thus secured, for the urine rarely ran into the bottle, but had to be collected from the catheter channel.

A reflection in the United States of these efforts in Europe at separation of the two urines is found in a discussion before the New York Practitioners' Society in 1883.¹² In the report of a case of hip-joint amputation with the aid of a Davy's level

to control hæmorrhage, Weir called attention to the fact that the ureters were within the area pressed upon by the lever, and suggested it might be used "to determine the comparative condition of the two kidneys," in place of the hand which Sands had employed in at least one case. In the discussion, Polk described a double-curved catheter he had devised and used on the cadaver to compress the ureter through the bladder against the pelvic wall.

How successfully ureteral catheterization was taken up in this country in 1892 by Kelly is familiar to all. But this method of separating the urines was not equally applicable in the male until the perfection of the catheterizing cystoscope by Albarran in 1897,¹³ since which time intravesical separation has been all but abandoned.

It is the object of this paper to call attention to a new intravesical separator, which again brings this method into prominence, and which is certainly destined to fill an important place in our armamentarium. My prophecy for it is not as sanguine as that of its originator; it cannot supersede ureteral catheterization in all cases, but it will surely be a valuable adjunct to that method,—one supplementing the other, each having its own field of usefulness. Further, it will make urinary separation possible in the hands of many who have not the time or inclination to learn ureteral catheterization. Luys's instrument is now widely used in France, and more recently in Germany, but as yet is scarcely known in the United States, only a few cursory references having been made to it. In England it has been discussed by Bickersteth.¹⁴ Before describing it, it is necessary to briefly refer to three instruments which immediately preceded it, and which constituted a new departure in urinary separation not yet referred to.

It was Lambotte, in 1890,¹⁵ who described the first instrument for partitioning the bladder. This consisted of a double sound provided at its distal extremity with two straight, parallel steel springs covered by a small rubber balloon. The springs when relaxed extended themselves and formed a con-

tinuation of the shaft of the catheter (Fig. 1), but when traction was made at the proximal end of the instrument on a rod



FIG. 1.—After Lambotte. Closed.

running between the springs, they outlined a circle or an ellipse according to the amount of traction, and with the rubber made taut, formed a vertical partition in the bladder (Fig. 2); when the springs were released they again became extended, and did not interfere with its removal. Lambotte seems to have employed the instrument with some success in both the male and female, and occasional reference is made to it by others;¹⁶ but apparently it was unknown to Neumann, who seven years later

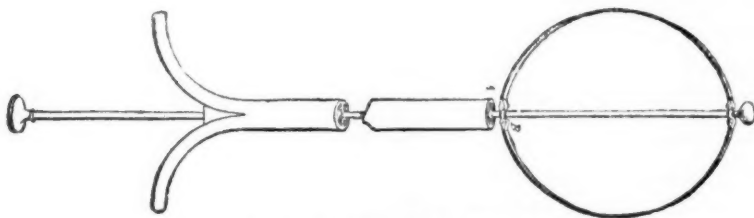


FIG. 2.—After Lambotte. Opened.

briefly described the second instrument for partitioning the bladder, this one only applicable in the female, however.¹⁷

Neumann's instrument (Fig. 3) consisted of a double catheter, provided with a median ridge which formed the septum between the ureteral orifices when pressed against the base of the bladder, supported by a finger in the vagina. This instrument attracted considerable attention. Kelly¹⁸ said that at first it looked as if it would limit the use of the ureteral catheter.

A year later, Harris¹⁹ described his urinary segregator, which is still used successfully by many, and is now so well known as to hardly need description. The principle involved was a new one and entirely original with him. By means of a lever introduced into the vagina, or into the rectum in the male, and pressed up against the base of the bladder, a sort of watershed was raised between the ureteral orifices, each side

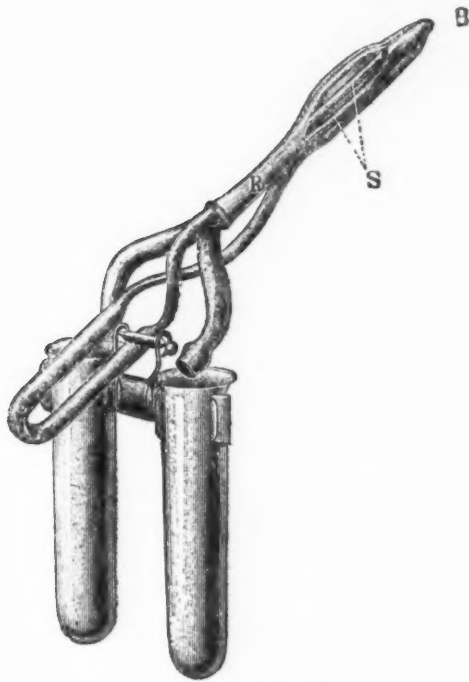


FIG. 3.—After Neumann.

being drained by an ingenious double catheter. This instrument I have used from time to time since its introduction, but never with a feeling of absolute security as to the results obtained. The lever and aspirating bulb complicated the instrument considerably. Downs's modification aimed at the elimination of the latter objection, and was successfully used in

Germany by Freudenberg and in France by Nicolich and others.

In France, the Harris instrument was first employed by Hartmann at the Lariboisière Hospital, Paris;²⁰ but it did not prove satisfactory in his hands. Early in 1901, his assistant, Luys, showed him a new instrument the latter had devised for intravesical separation of the two urines, and from the first trials of it, which were made in his clinic, its superiority to the Harris instrument was apparent, and, slightly modified, has been in constant use there since. "In all," Hartmann says, "over 400 applications of the instrument have been made in 210 males and females, without accidents and with perfect results, establishing in an irrefutable manner the accuracy of the method; the question being settled for all those who have seen it used, and further discussion impossible. Its simplicity and facility of manipulation, which puts it at the door of all practitioners, explains how, in a short time, intravesical separation of the urines, until this moment almost abandoned, has made, so to speak, the tour of the world. Very rapidly it has been accepted, and has taken the place of catheterization of the ureters, which until now has reigned supreme in Paris. The Necker Clinic, where ureteral catheterization originated, and where it was vulgarized, seems actually to abandon it, as the successive publications of Cathlin and Legue indicate."

Luys states²¹ he began to study the subject immediately after the termination of his "Internat" in 1890. In the course of his dissections, he was struck by the fact, so simple and so well known, that when one has the opened bladder before him, and places the extended finger between the ureteral orifices, one can depress the base of the bladder, and thus create two pockets, entirely distinct, in which will collect the separate secretion from each kidney. It was manifest that, to obtain a good intravesical separation of the urines, it was not necessary to partition the upper part of the bladder, but only necessary to thus depress its base to prevent all mixing of the two urines, if one insured the drainage of each pocket to prevent too great an accumulation of urine in them. He therefore simply substituted for his

finger an instrument which could be readily introduced through the urethra, intended to thus depress the base of the bladder, and provided with a median partition to be extended at will.

The essential principle, then, to which he directed his efforts, was the elevation of a water-tight septum, in the small triangle lying between the ureteral orifices and that of the urethra, in such a manner as to collect on each side the secretion from the corresponding kidney, and providing free drainage for each side so as to prevent accumulation of urine within the bladder. He points out that the three elements of the trigone, *i.e.*, the urethral and right and left ureteral orifices, have a fixed relation to each other, quite independent of the dimensions of

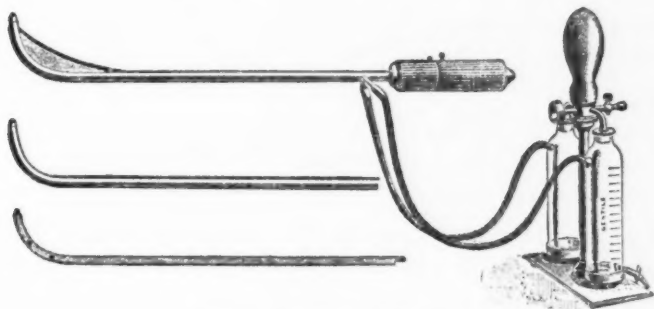


FIG. 4.—After Luyers. Earlier model.

the bladder itself. The distance between the ureteral orifices varies always between twenty and thirty millimetres, while that from the apex of the triangle (the urethral orifice) to the base of the triangle (a line connecting the two ureteral orifices) is equally constant, between twenty-five and thirty millimetres.

To these fixed relations he adapted his instrument of fixed and uniform dimensions. It consisted of three parts,—two removable hollow metallic sounds of the ordinary Guyon curve, flattened on their inner surfaces to accommodate between them the third piece, a flattened metallic stem of the same curve (Fig. 4). This intermediate piece carries the handle of the instrument, and, projecting a little beyond the convex surfaces of the two laterally placed hollow sounds, forms the metallic

septum when pressed against the base of the bladder; in its concavity lies a small chain, like that of an *écraseur*, which forms a chord to the arc of the extremity of the instrument when made taut by a screw in its handle. A *gutta-percha* "chemise" covers this intermediate part like a finger-stall, and when raised by tightening the chain forms a rubber septum in the bladder three centimetres high, above which the urines cannot mix, as constantly drained from each side by the hollow metallic sounds. When slackened, the resiliency of the rubber "chemise" carries the chain back into place in the concavity of the curve of the metal stem. The two hollow metallic sounds fit into the handle on each side of the stem, and are attached to the latter at its distal extremity by a small screw cap; the instrument thus assembled has a circumference of about twenty-four millimetres. The openings in the lateral catheter channels for draining the urine from each side of the septum are on the inner and upper surfaces, to avoid their occlusion by the mucous membrane of the bladder.

The simple Guyon curve of the original instrument (Fig. 4) exposed it to three objections. Considerable pain was often caused by dilating the neck of the bladder in extending the rubber septum, if the entire chain and arc subtended by it were not within the bladder, or if the full introduction was prevented by an anteroposterior diameter of the bladder of less than seven centimetres. Second, there existed sometimes, below the convex surface of the metallic septum, a small retroprostatic cul-de-sac (Fig. 5), permitting a partial admixture of the urines, to avoid which it was necessary to lift that part of the bladder wall against the instrument with the finger in the rectum. And, third, by reason of the elevated position of the handle of the instrument, an aspirating bulb was necessary. (Fig. 5.)

The subject of the best catheter curve for drainage of the bladder, especially in cases of prostatic hypertrophy, had recently been studied in France by Escat.²² By adopting what is known as the Escat curve (Fig. 6), all three of the above difficulties incident to the simple Guyon curve were at once overcome.

Later, Luys had constructed a smaller model, No. 15, to be used on children, and, at the invitation of Albarran, success-

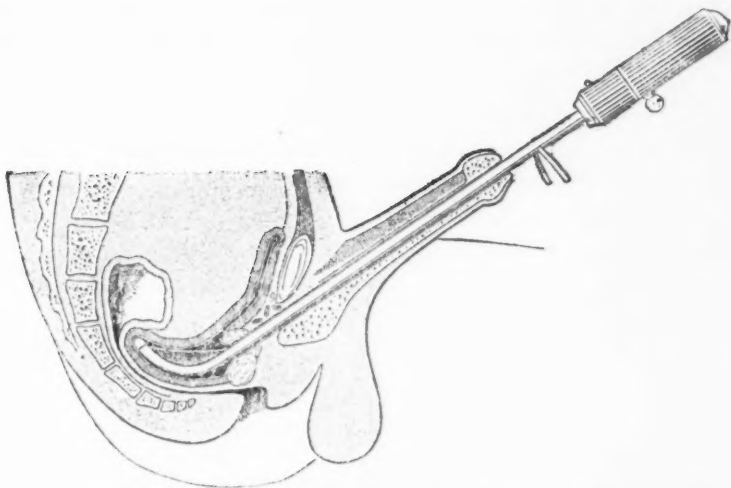


FIG. 5.—After Luys. Showing retroprostatic cul-de-sac with earlier model of instrument.

fully separated the urines in the case of a little girl of six and a half years, in which this skilful operator was unable to catheterize the ureters,—on the left side because the ureteral orifice

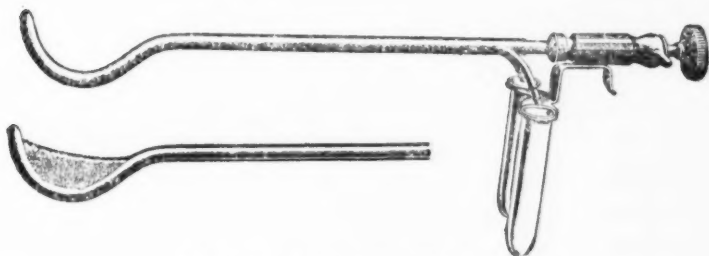


FIG. 6.—After Luys. Later model assembled.

could not be found, and on the right side because of numerous fungosities arising within the ureter and encircling the orifice.²³ The character of the urine obtained by the separator from the

left side pointed to disease of that kidney, which was corroborated a few days later by nephrectomy performed by Albarran.

As the instrument has a fixed curve, it is necessary to adapt the posterior wall of the bladder to it by bringing the patient into a sitting position after its introduction. Luys has found on the cadaver, as long as this position is maintained, the septum is perfectly stanch. If the patient had to be anaesthetized, a necessity hardly liable to arise, the upright position might constitute an objection to the use of the instrument. Luys mentions one case, with a very painful secondary tubercular cystitis, in which a few whiffs of chloroform were required. At first sight this unusual curve for a urethral instrument suggests difficulty and pain in its introduction; and, indeed, these

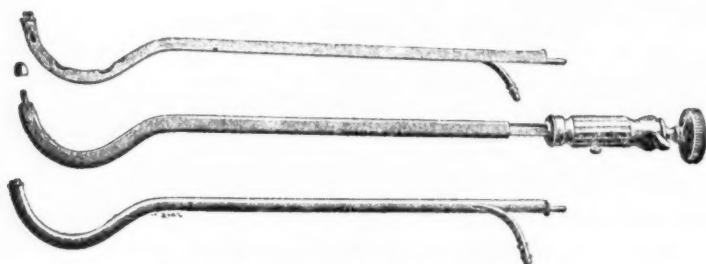


FIG. 7.—After Luys. Later model, showing parts.

are the chief objections raised against the instrument. If one attempts to remove it from the bladder with the same upward motion of the handle appropriate with the simple Guyon curve, this can only be accomplished by brute force, which will be most painful. The handle must be first depressed and then elevated, and if any difficulty is experienced, a slight elevation of the pelvis with a support under the buttocks will give room for still greater depression of the handle. The same movement of alternate depression and elevation of the handle also secures the introduction of the instrument without pain. In its present form with the Escat curve, the development of the rubber septum is absolutely painless, once the instrument is within the bladder, and if properly maintained in position is not more

than uncomfortable, as apprehensive patients have informed me. I have several times permitted it to remain an hour in place, though sufficient urine is usually obtained in twenty or thirty minutes.

The handle is very slightly raised, and forward traction made so as to apply the convexity of the instrument snugly against the base of the bladder. Luys says that if one is careful to combine gently these two movements, *i.e.*, slight traction and then elevation of the handle, one can be certain the septum is

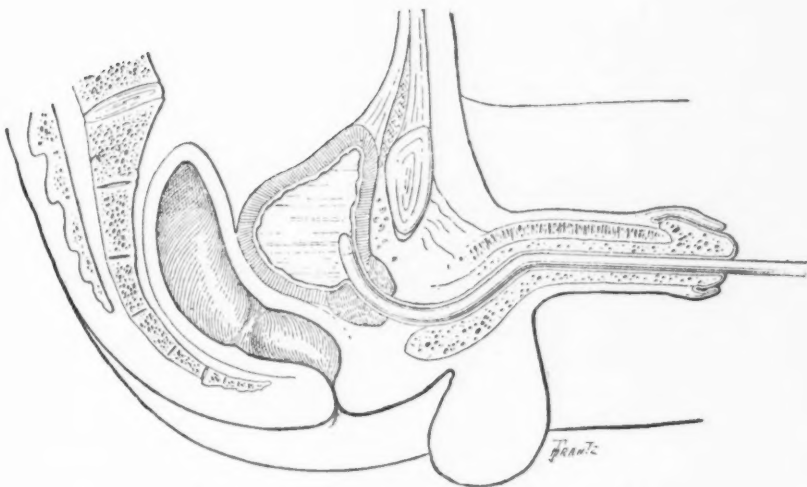


FIG. 8.—After Luys. Instrument partially introduced.

perfect and that the urines do not mix. No force is used; it simply being necessary to bring the elasticity of the tissues into play and feel slightly the resistance of the neck of the bladder and its base. If the handle is too vigorously elevated, the patient complains a great deal. A rectal examination will assure the operator the instrument is accurately placed, and the patient is instructed how to so keep it; it is inadvisable to use the support, as Luys himself states, because the patient may accidentally move and change his position with reference to the instrument, and thus jeopardize the separation.

Before introducing the instrument, the bladder is first thoroughly washed out, forty or fifty cubic centimetres of boracic acid solution being allowed to remain to start the siphon. If the patient secretes less than a litre of urine a day, Luys suggests a diuretic or a copious drink of water a quarter of an hour before the separation. The lower bowel should be empty and a previous examination demonstrate no obstruction exists in the urethra.

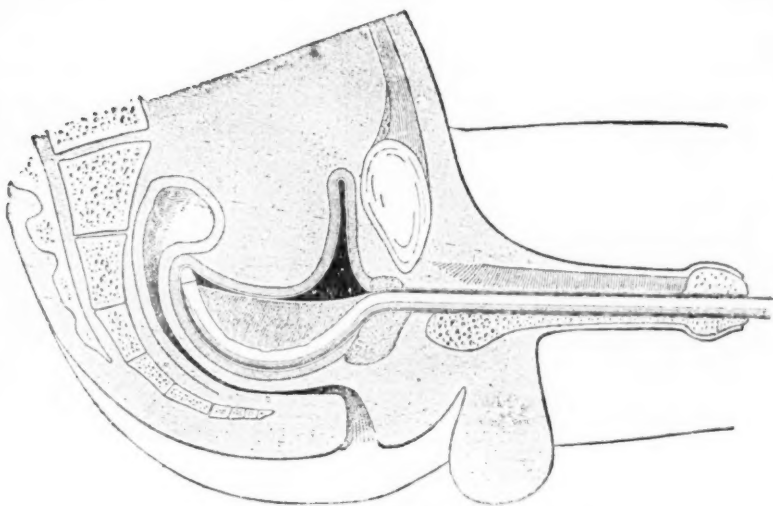


FIG. 9.—After Luys. Instrument fully introduced.

The accuracy of the separation, if the instrument is properly used, in suitable patients cannot be questioned in view of over 200 case histories reported by Luys, which include nephrectomized patients with not a drop of urine flowing from the catheter corresponding to the side operated upon, and patients with a hæmaturia or pyuria with absolutely clear urine on the sound side.

There is another instrument for the intravesical separation of the urines much used in France, devised by one of Guyon's assistants at the Necker Hospital, Cathlin, whose name was already well known as the author of the epidural route for

spinal injections. The central idea in this instrument seems to have been to overcome the fixed dimensions of Luys's instrument and adapt it to the varying capacity of different bladders. This he accomplished in a very clever manner by means of a thin pear-shaped rubber septum attached to and supported at its periphery by a thin ribbon of watch-spring steel. The septum is concealed in the shaft of the instrument and pushed out into the bladder to a distance, as indicated by a scale on the shaft, corresponding to the previously determined capacity of the bladder. The one great advantage of the instrument is in bladders of very small capacity; Legue²⁴ reports a successful application in which the bladder would only hold eighteen cubic centimetres.

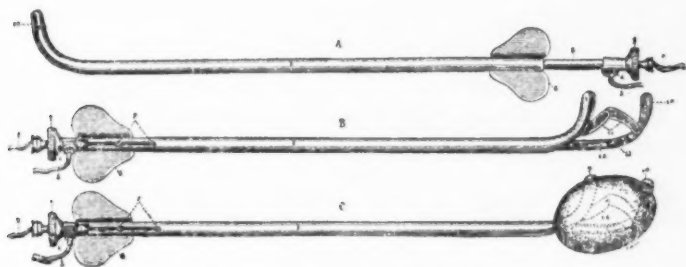


FIG. 10.—After Rochet and Pallenda.

But this feature is outweighed by several objections,—greater cost, larger caliber (No. 28), smaller catheter channels, and an increased liability therefore to their occlusion; but more than all, an uncertainty as to the stanchness of the septum, which is jeopardized if the membrane is developed too far or not far enough, when a fold of the rubber tissue of the diaphragm, and not the metallic periphery, is applied to the bladder wall. In a bladder which contracted strongly, the delicate membrane would be doubled up, or, if the bladder wall is relaxed, as in chloroform narcosis, the instrument cannot be employed, as Cathlin himself states.²⁵ The success of the separation is consequently subordinate to the contractility of the bladder, which, as Luys points out, it is absolutely impossible to

regulate, and further urges against the instrument that the idea of vesical graduation is entirely foreign to the principle of intravesical separation of the urines. The Cathlin instrument has been used in this country by Keen and Valentine. It might be successful in the presence of a fibroid uterus or carcinoma of the cervix in which the depression of the base of the bladder necessary for the Luys instrument could not be obtained.

In the rare cases of vesical fistulæ where the bladder could not be distended with either air or water, a new instrument (Fig. 10), described by Rochet and Pallenda,²⁶ for compressing the ureteral orifice, and almost identical in principle with the instrument of Silbermann, may find a field of usefulness.

Before indicating wherein intravesical separation is to be preferred to ureteral catheterization, let us consider briefly what legitimate objections can be entertained against this latter procedure, for theoretically one acknowledges it is the ideal method of urinary separation.

First, its difficulty is urged by a large number who either have not the time or inclination to acquire the necessary ability; but for those who use the cystoscope this objection does not hold in the majority of cases, though in the hands of the most expert in some cases ureteral catheterization is impossible. To those whose first efforts have been made with the indirect lens system, as were my own, the comparative facility of the operation with the direct cystoscope, which has been perfected in this country by Tilden Brown, will come as an agreeable surprise.

A second and serious objection is our knowledge that there is a danger which, though small, actually exists. Two or three deaths at least have been reported from simple exploratory catheterization, as that cited by Tuffier.²⁷ Sampson, the Resident Gynecologist at Johns Hopkins Hospital, recently had a death from an ascending ureteral infection as the result of employing the catheter as a guide to the ureter during a hysterectomy for cancer of the uterus. Israël²⁸ reported the case of a physician with an old urethritis and a slight cystitis. One ureter was catheterized by Casper because of lumbar pain on that side; the urine collected through the ureteral catheter was clear, and the

patient rejoiced that his kidney was normal. That night he was seized with lumbar pains, chills, fever, vomiting, and later passed a cloudy urine containing pus. This condition still persisted at the end of three years, with fever and pyuria. Hartmann²⁹ points out that a slight pyonephritis set up by the ureteral catheter would not attract immediate attention, but would require a certain time to develop, and perhaps not be traced to its true cause. Krotoszyne³⁰ says that Nitze, in a personal conversation, stated that in his opinion catheterization of the ureters had done a great deal of harm because performed without strict indications. Nearly all operators regard a severely infected bladder as a dangerous circumstance in the use of the ureteral sound; in the presence of a tubercular kidney, the catheterization of the supposedly normal side is absolutely impermissible.

Albarran,³¹ however, regards ureteral catheterization as entirely innocuous, and in support of this contention cites the 1000 cases of Casper, a like number of his own, the hundreds of Nitze, those of Pasteau, more than 500; of Kolischer, more than 500; Bierhof, 475, and many others. The dangers are probably overrated by the majority of antagonists of ureteral catheterization, but they are great enough to demand most careful attention to asepsis, and a regard for legitimate contraindications.

A third difficulty is encountered, if but one ureter is catheterized, and it is not entirely occluded by the sound; a part or all of the bladder urine, which is regarded as the secretion from the uncatheterized kidney, may come from the catheterized side by reason of the urine on that side trickling between the wall of the ureter and the catheter. Albarran has endeavored to overcome this with a specially devised catheter with open end and a slight swelling immediately behind. This source of error is, of course, entirely avoided by simultaneous catheterization of both ureters.

The following points of superiority, then, can be advanced for the Luys instrument: its simplicity and freedom from all danger reduces urinary separation from the dignity of an oper-

ation to a procedure, and gives it a certain medical interest; in fact, last year a Paris Thesis³² was devoted to the medical aspects of the subject; tuberculosis of one kidney or an infected bladder do not constitute contraindications to urinary separation with this instrument. In children, in prostatics, and in patients with a reduced bladder capacity, it is successful where catheterization may be impossible. Among Luys's cases of prostatic hypertrophy, however, I find one in which the separation could not be effected, because the use of any instrument caused bleeding in passing the prostate and the blood-clots plugged the mouths of the catheters.

The following advantages of ureteral catheterization over intravesical separation are urged by Albarran:

First. Absence of bladder contamination. This I admit as far as bacterial contamination is concerned; but as to histological elements, if the bladder is first thoroughly washed out, even in a severe cystitis the small area over which the urine flows could not furnish enough pus to give rise to an erroneous interpretation, a point always made by Harris with regard to his instrument; in the presence of a hæmaturia, an examination of the bladder would naturally first be made.

Second. Greater security as to actual separation would seem to be absolutely refuted by Luys's 210 cases. The only possible error with the Luys instrument, properly used in suitable cases, comes from an atypical implantation of the ureteral orifices. The authors who have devoted themselves to a study of anomalies of the trigone are very few; but it is well known that such anomalies are very rare. If the examination furnishes two identical urines, this would necessitate a cystoscopic examination to demonstrate whether the ureteral orifices were normally placed; usually, however, the accuracy of the separation is attested by at least slight differences in the specimens. In the very rare cases in which there is a double ureter on one or both sides, the Luys instrument might give more reliable information than catheterization.

Third. Simultaneous cystoscopy is an undeniable advantage, but only in a first examination.

Fourth. Simultaneous exploration of the ureter is also an undeniable advantage, but only at the first examination. Luys describes a method of Berger, which he has made use of a number of times successfully in dilatation of the pelvis, intermittent retentions, kinking of the ureter due to displaced kidney, etc.; the manœuvre consists simply of elevating slightly the diseased kidney towards the diaphragm, which will empty the pelvis of its tell-tale contents, when otherwise little or no urine would be secured from that side.

Fifth. If the contention of Albarran that a correct estimate of the functional capacity of the kidneys can only be arrived at by a study of the separated urines collected during at least four to six hours, or better twenty-four hours, proved to be true, the usefulness of Luys's instrument would be greatly restricted, for the ureteral catheter has been allowed to remain *in situ* twenty-four hours, anything approaching which would be impossible with Luys's instrument. But Albarran is alone in this contention, others, including Casper, maintaining that a better conception of the functional capacity of the kidneys is obtained by several examinations on successive days, or fifteen to twenty minutes' duration.

Albarran's fifth and final claim is that the catheterizing cystoscope is easier to introduce than the Luys instrument.

It is now apparent that each of these two methods of separation has a field of usefulness of its own, one supplementing the other. There are certain well-defined indications for the ureteral catheter, but in a large majority of cases the instrument of Luys will be found sufficient "to permit a rigorously precise diagnosis of the functional state of the kidneys and lay down the indications for operation." (Hartmann.) The ureteral sound will be used in locating stone and stricture; and in connection with the X-rays, after the suggestion of Illyès,³³ to outline the ureter and locate the kidney; to collect urine for bacteriological examination; to exclude the ureter as the source of pus or blood, and of course for therapeutic purposes.

Separation of the two urines has extended far beyond its

original indications. It is demanded in all cases of hæmaturia; in the early diagnosis of renal tuberculosis; in all obscure abdominal tumors as an aid in differentiating between involvement of the kidney and surrounding organs. In view of the work of Edebohls and his followers in decapsulating the kidneys, urinary separation should be resorted to early in all cases of nephritis. Edebohls³⁴ in 1901 reported eight instances of unilateral nephritis among nineteen cases of chronic Bright's disease on which he had operated, and recently added three more out of a total of seventy-two cases. "This feature of my work," he says, "evoked, perhaps, more comment than any other, and met dissent and incredulity in not a few quarters." The further necessity of urinary separation as a preliminary to all operations on the kidneys is shown by the statistics of v. Schmieden;³⁵ in a series of 1118 nephrectomies he found that of 301 deaths following the operation, fifty-six times it was due to anuria, or uræmia, in consequence of disease, or entire absence, of the other kidney.

The present lowered mortality in kidney surgery is for the most part due to a preliminary study of the separated urines. While the efforts of the last few years towards an exact appreciation of the functional capacity of each kidney have been unsuccessful, a comparison of the two urines, as to freezing-point, phloridzin elimination, chemical and microscopical characteristics gives us an approximate idea, and at the same time most valuable surgical indications. A consideration of this aspect of urinary separation, however, would lead us beyond the limits of this paper.

In conclusion, I will briefly detail several case histories illustrative of the use and accuracy of Luys's instrument:

CASE I.—Mr. S. came to me complaining of rheumatic pains in arms, legs, and especially in the back, which latter were exaggerated by the muscular exertion of stooping, for instance, just as in an ordinary lumbago. A rather large amount of amorphous urates from a freshly passed and centrifugalized specimen of bladder urine, containing also a few granular casts, many pus-cells but no albumen, immediately directed attention to his kidneys.

The next day I separated the urines with Luy's instrument, believing, however, that I was dealing with a medical affection of the kidneys.

Instrument permitted to remain fifty-five minutes. Preliminary injection of five milligrammes of phloridzin half-hour before.

	RIGHT.	LEFT.	BLADDER.
Amount.	28 cubic centimetres.	12 cubic centimetres.	Cloudy.
Color.	Cloudy and very high colored.	Clear and straw-colored.	
Amount of deposit with centrifuge.	.2 cubic centimetre, composed mainly of amorphous urates, few pus-cells.	No deposit.	.2 cubic centimetre, composed of amorphous urates and many pus-cells.
Phloridzins.	Phloridzin negative.	Negative.	
Urea.	12 grammes per litre.	Same.	14 grammes per litre.

The large deposit of amorphous urates on one side only, from freshly passed urine, suggested a renal calculus. Next day took two radiographs; both showed a stone in pelvis of the right kidney.

CASE II.—Mrs. R. Husband brought specimen of wife's urine for examination; she had been sick several months, and nature of illness had not been determined by her physicians in the neighboring village where they lived. Urine contained a large amount of pus but no kidney elements. Centrifugalized a large amount of urine and stained the pus for tubercle bacilli with positive results. I gave the husband an unqualified diagnosis of a tubercular lesion some place in the genito-urinary tract. A week later I was requested to see patient for the purpose of determining, if possible, the exact seat of the trouble. I found the right side of the abdomen in the kidney region very sensitive, and the muscles so rigid I could not palpate the kidney, but on percussion it was easy to make out what was apparently that organ, very much enlarged. Cystoscopic examination showed the seat of the trouble was not in the bladder. I separated the urines with Luy's instrument.

	RIGHT.	LEFT.
Amount.	7 cubic centimetres.	4 cubic centimetres.
Urea.	Urea, 25 grammes per litre.	10 grammes per litre.
Pus.	Large amount of pus containing tubercle bacilli.	Few pus-cells, no tubercle bacilli.

I made an unconditional diagnosis of tuberculosis of right kidney. The small urea output on opposite side suggested a further study of the secretion from that kidney before a final decision as to operation. I so explained to the husband. I tried to get other bladder specimens to watch the urea excretion, but was informed "they were out of specimens," which rather amusing statement was explained later by the husband frankly acknowledging he had endeavored in every way to disprove my diagnosis, sending specimens to the State Laboratory, to Mulford's in Philadelphia, also, I believe, and in many other directions. Nephrectomy by a confrère without further separation of urines; diagnosis confirmed. Death on third day with uræmic symptoms.

CASE III.—Mr. L. had an asthenia of undetermined cause. Because of a peculiar bronzing of the skin, the possibility of Addison's disease had been entertained by one of my professional friends. History of a hæmaturia about six months before, however, suggested a separation of the urines.

	RIGHT.	LEFT.	BLADDER.
Amount.	8 cubic centimetres.	10 cubic centimetres.	
Appearance.	Clear.	Clear.	
Urea.	Urea, 14 grammes per litre.	Same.	20 grammes per litre.
Chemical examination.	Quantitative comparison of chlorides, phosphate, and total purins with the centrifuge gave same amounts on both sides.		

Asthenia, bronzing of skin, and the hæmaturia explained by eliciting a history of chronic malarial poisoning.

CASE IV.—Mr. S., thirty-five years old, two years ago suffered from a depression in health, the cause of which I could not determine. I went over his chest most carefully because of a slight cough, but found nothing even suggestive of tuberculosis. I gave him an injection of tuberculin with negative results. Several examinations of the urine were likewise negative. A couple of months in the country restored his health sufficiently to keep him

out of my hands for two years, though he has not been perfectly well. This spring he began to lose flesh, and again consulted me. My suspicions as to a tubercular lesion in the lungs were again excited. I had him take his temperature daily. It was found that he was running a temperature between 99.5° and 100.5° F., which continues to date. Pulse has been constantly around 100. An X-ray examination of chest being negative as to any evidence of tuberculosis, I repeated the injection of tuberculin of two years before, giving ten milligrammes at the first dose; no reaction. It was at this time I elicited the history of a venereal sore five years before. I conferred with the physician who treated him, who told me there were no secondaries, but that the patient was so worried about the affair he gave him a course of mercury by the mouth. This was most unfortunate, for there was no way to exclude syphilis as the cause of his present depression in health except to try the effects of specific treatment. Took mercury three months by the mouth without effect on symptoms. Was not materially improved by about two months in the country.

Several examinations of the urine were negative before my vacation. On my return I was greatly surprised on again examining a specimen to find a distinct ring of albumen. Previous failures to detect albumen were explained by daily examinations of the urine, a distinct ring being present one day and entirely absent for the next two or three, perhaps. Attention having thus been directed to the kidneys, I separated the two urines with the Luys instrument with the following result:

	RIGHT.	LEFT.	BLADDER.
Amount.	17 cubic centimetres in 45 minutes.	15 cubic centimetres.	
Urea.	15 grammes per litre.	Same.	23 grammes per litre.
Specific gravity.	1025.	1020.	1030.
Casts.	Few, hyaline and waxy.	None.	
Mucus.	Considerable mucus.	Same.	
Pus-cells.	Large number of pus- cells. Number of large, round, and caudate cells, with degenerated nuclei on right side, but many more on the left side.	Few.	

In referring to large amounts of mucus, cells, etc., I refer to all that could be obtained in the tip of the tubes of the centrifuge. The total amount was about .4 cubic centimetre, and macroscopically simply had the appearance of a cloud of mucus.

A low blood-pressure of 110 enables me to exclude contracted kidneys; the blood examination showing only a slight anæmia excludes any malignant disease of the kidneys. (Hæmoglobin, 100; reds, 4,750,000; Sp. gr. 1063; slight leucocytosis.) Diagnosis apparently lies between syphilis of the kidneys and slight pyelonephritis due to colon or other infection, with weight of evidence in favor of latter because of negative results from mercury. In view of the statement of Israël that mercury does not agree with the syphilitic kidney, and that, on the contrary, potassium iodide does act favorably in those cases, I have recently begun pushing the latter without yet having had time to know what the result will be. An X-ray examination excluded kidney calculus.

A second separation with Luys's instrument gave the following result:

	RIGHT.	LEFT.	BLADDER.
Amount, end of one hour.	12 cubic centimetres.	8 cubic centimetres.	
Specific gravity.	1021.	1027.	1032.
Urea.	11 grammes per litre.	13 grammes per litre.	21 grammes per litre.
Bacteria.	Few.	Abundant. Large number granular.	Abundant.
Casts.	3 or 4 hyalines.	Little.	Large amount.
Mucus.	Large amount.	But little.	Large amount.
Amorphous urates	Large amount.	Few.	Few.
Pus-cells.	Goodly number.	Same.	Same.
Albumen.	Heavy ring.	Abundant.	Few.
Caudate and large round cells.	Few.		

A week later I catheterized both ureters. The bladder urine was almost free from any deposit when centrifugalized, and there was the merest trace of albumen; catheters were pushed to pelvis on each side:

	RIGHT.	LEFT.	BLADDER.
Amount.	7 cubic centimetres.	5 cubic centimetres.	
Amount of deposit when centrifugalized.	.4 cubic centimetre of solids.	.2 cubic centimetre, mere cloud.	
Appearance.	Cloudy.	Perfectly clear.	Clear.
Bacteria.	Large number; also cells looking like yeast.	None.	None.
Large, round, and caudate cells, with granular protoplasm and nucleus gone.	Great quantities.	None.	None.
Casts.	Few hyaline.	None.	None.
Specific gravity.	1015.	1020.	Not taken.
Urea.	12 grammes per litre.	Same.	Not taken.
Albumen.	Trace.	Same.	Same.

It will be seen from this last separation that the ureteral catheter emptied a slight retention in the right pelvis, and still further upholds the diagnosis of a pyelonephritis.

[NOTE (two months later).—A bacteriological examination of the catheterized specimens did not demonstrate a pathogenic organism. The patient has gained twelve pounds in two months since the administration of strontium iodide was begun, and for the first time in six months is without fever.]

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DISLOCATIONS OF THE PATELLA, WITH ROTATION ON ITS HORIZONTAL AXIS.

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DISLOCATIONS of the patella with rotation on its perpendicular axis are not specially rare. In these the bone is revolved through 90° , one or other lateral edge resting in the groove between the femoral condyles (Fig. 1), or through 180° , so

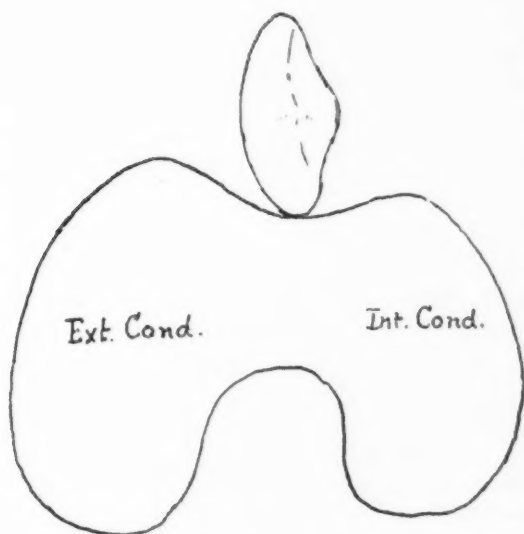


FIG. 1.—Dislocation with rotation on perpendicular axis.

that its articular facets look directly forward, the tendons of the quadriceps and ligamentum patellæ being twisted or ruptured.

But of dislocations with rotation on the horizontal axis, and the bone wedged in the notch between tibia and femur

(Fig. 2), only five cases have been reported, abstracts of which will be found below. To these I am able to add a sixth, the history of which is as follows:

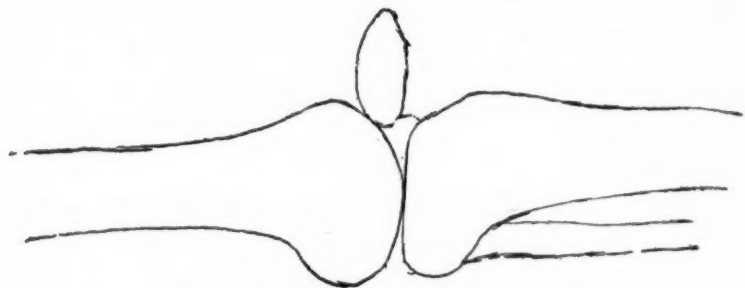


FIG. 2.—Dislocation with rotation on horizontal axis.

On Friday, July 1, 1904, Drs. Conway and O'Brien, of this city, were summoned to attend John —, aged thirteen years, who had been thrown from a moving railroad train and sustained an injury of the left knee. The patella could be plainly felt projecting

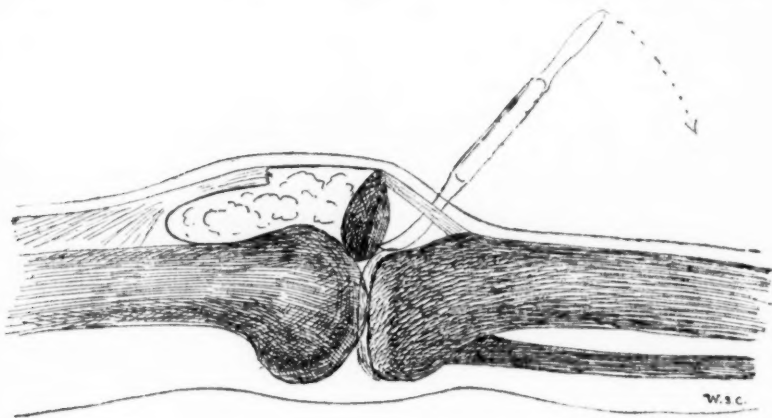


FIG. 3.—Luxation of patella on horizontal axis. Joint cavity distended with blood. Method of reduction.

straight forward from the space between tibia and femur. The fingers inserted above it entered the joint cavity, only skin and superficial tissues intervening. The leg was readily flexed and extended. (Fig. 3.)

Under chloroform all efforts to lift the patella out of its false position failed, and like ill-success attended a second trial on the following morning (Saturday). Saturday evening, at the Auburn City Hospital, Drs. Conway and O'Brien kindly referred the case to me, and with the patient chloroformed I was able fully to verify their diagnosis already made, but was likewise unable to reduce the displacement. The patella moved slightly laterally, and its engaged superior border could be felt to grate on the cartilaginous surfaces of the bones, but it could not be lifted out of its insertion between them, being evidently held there by the stretched ligamentum patellæ and the fibres of the joint capsule. It was judged that the quadriceps tendon must be ruptured, thus permitting the fingers to dip deeply into the joint above the displaced patella, and allowing full flexion of the leg. There was at the time of my examination much swelling of the whole joint. Preparations were at once made for operation, which was done the following morning, July 3.

Under ether a large semicircular flap, convexity upward, was turned down, exposing the tendinous structures of the knee. All tissues were infiltrated with blood. A longitudinal opening made in the joint above the patella gave exit to much bloody serum and clots. The joint cavity was irrigated with hot saline solution till clean. Efforts were then made by the hands and by lion-jawed forceps to lift the patella from its lock in the joint. All were unsuccessful. The bone was so firmly held by the tense ligamentum patellæ and the other tendinous structures that the grip of the lion-jawed forceps repeatedly slipped. Finally, through a slit near the ligamentum patellæ, the curved end of a blunt dissector was introduced under the patella in the manner shown in Fig. 3, and the bone pried out of its engagement in the joint, whereupon it leaped suddenly into normal position.

The upper edge of the patella hitherto hidden between tibia and femur was now seen to be completely severed from the quadriceps tendon. No particle of the tendon remained attached to it, but some bony fragments torn from the knee-pan remained attached to the tendon. A final wash-out was given the joint cavity, and the separated tendon sutured by chromicized gut to the periosteum and aponeurotic fibres of the patella. Other divided structures were similarly united, and the large flap brought into place by a subcutaneous catgut suture, a few strands of silkworm gut

being left in the lower end of the incision on either side of the joint, as a drain. Gauze dressing. Limb straight in plaster, and in bed elevated 45° to relax quadriceps.

Healing virtually reactionless. Highest temperature recorded 100° F. On the twelfth day joint examined through a window cut in the splint, and found without effusion, and the wound healed *per primam*, except where a small area of skin had sloughed at the upper border. This healed quickly. No use of joint allowed till twenty-third day, in order that union between patella and quadriceps tendon might become strong. Slight flexion was begun and patient allowed to walk. Massage. By August 8 (thirty-sixth day) flexion to right angle, and free use of joint

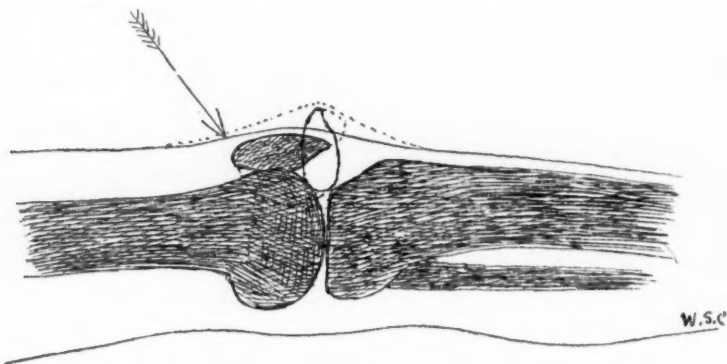


FIG. 4.—Probable mechanism of injury.

encouraged. On September 10 recovery of all motions complete. Tendon of quadriceps felt firmly united to upper border of patella.

The mechanism of the injury seems plain. Whether the leg were flexed or extended, force delivered in the direction of the arrow (Fig. 4) at point of attachment of quadriceps tendon to the patella could sever this attachment, turn the patella on its horizontal axis, and, continuing, push its freed upper border downward into the crotch between femur and tibia, where it would be locked by the patellar ligament and capsular fibres stretching like guy-ropes of a tent in all directions.

For purposes of comparison, a brief *résumé* of the other cases on record is added.

CASE I.—MIDELFART. "A Rare Dislocation of the Patella." Norsk. Mag. f. Laegevidenskaben, 1887, Vol. xlvii, p. 588.

A boy aged twelve years fell on a sharp stone, receiving what was taken by the physician first in charge for a fracture of the patella. The supposed lower fragment was felt immovably fixed, while the upper could not be found. To clear up the case, Midelfart opened the joint transversely. It then appeared that the quadriceps had been separated from the upper margin of the patella, taking with it small fragments of bone, and that the patella had been turned directly forward, articular surface downward, and forced into the space between femur and tibia, the ligamentum patellæ remaining intact.

Patella elevated into position by manipulation, and capsule and skin united by catgut. Healing by first intention. Ultimate result as to function not stated.

CASE II.—SZUMAN. Archiv f. klin. Chirurgie, 1889, Vol. xxxix. "Eine seltene Form von Patellarluxation."

February 1, 1888, F. S., aged twenty-seven years, was drawn under the cylinder of a hay-cutting machine. Limped to house, but could not extend leg, which was bent at an obtuse angle. Pain on motion. Ecchymoses, œdema, and a visible and palpable depression in place of the patella. From the space between the external femoral condyle and tibia is a sharp transverse projection (the patella). A tightly drawn cord goes from this projection to the quadriceps muscle (the quadriceps tendon), and from the foremost angle of the projection another to the tubercle of the tibia (ligamentum patellæ). (Fig. 5.)

Chloroform. Attempts at reduction failed, as the patella could not be rolled over the external condyle. Leg moved freely, and could be bent inward sharply, hence laceration of internal lateral ligament, but could not be straightened beyond 135° on account of patella wedged between the bones.

Operation through resection incision (which, not stated). After opening joint, patella could still not be gotten over the external condyle. It could be drawn forward a little, but always slipped back. Therefore cut ligamentum patellæ. Joint now gaped widely, showing patella deeply wedged between external condyle and tibia, the anterior surface looking downward, posterior surface upward. Crucial ligaments torn and capsule lacerated in several directions, notably by the sharp anterior angle of the external condyle. After several efforts, pushing the patella forward while lifting it off from the external condyle, an assistant pulling it with hooks, the bone slipped with an audible snap into normal position.

Joint drained; ligamentum patellæ sutured with catgut; crucial not sutured, as they seemed to lie well together; splint and elevation. Afebrile course. Splint continued several weeks; two months later knee gave 20° motion.

CASE III.—DEADERICK. "Case of Rupture of Quadriceps Femoris Tendon with Dislocation of Patella beneath the Intercondyloid Groove of the Femur." ANNALS OF SURGERY, 1890, Vol. xi, p. 102.

Youth aged nineteen years, fell while trying to board a train, and dislocated left patella. Bone torn loose from upper attachment, and turned on lateral axis three-eighths of a circle, its longitudinal axis forming an angle of 45° with the tibia. Chloroform. Strenuous efforts made at reduction, but all failed, as did others made next day. How strenuous were these efforts appears from the fact that a four-pronged steel hook was in-

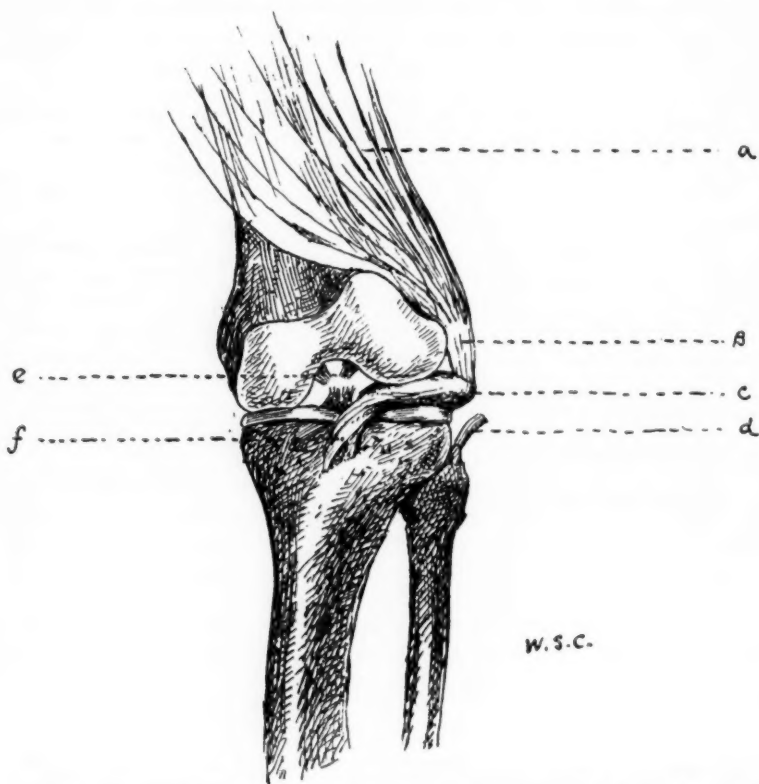


FIG. 5.—Szuman's case, reproduced from illustration accompanying his report. *a*, Quadriceps extensor; *b*, quad. extensor tendon; *c*, patella; *d*, ruptured ext. lateral lig.; *e*, ruptured crucial lig.; *f*, lig. patella.

serted through the skin into the patella, and great force used in the endeavor to lift it out of its lock between the bones. Author then by means of an extemporized windlass, strong enough, he thinks, to lift an ox, and a cord slung about the patella, tried to pull it away from its engagement, but again scored a failure. Then lifting the patella with one hand, and pulling on its upper edge in the direction of the thigh axis with the other, it turned with a sudden jerk and fell into normal position. The

windlass must have stretched the tendons, as the same manœuvre had been repeatedly tried before.

CASE IV.—SCHMIDT. *Centralbl. f. Chirurgie*, No. 41, p. 1023, 1900.
 "Ein Fall von Luxation der Patella nach Abriss der Quadricepssehne."

On December 25, 1899, B., aged sixteen years, miner, fell, striking the knee on edge of a rail. Sudden pain above patella. Knee swollen and at right angle. Slight extension possible, but much pain. Under edge of patella points forward; above it a cavity admitting three fingers, in which can be felt the front (now upper) surface of the patella and con-



FIG. 6.—Sketch of Röntgen photograph accompanying Schmidt's case.

dyles of the femur. Upper border cannot be felt, because set in the space between femur and tibia. (Fig. 6.) Efforts to reduce unsuccessful.

Incision in perpendicular direction, seven centimetres in length over middle of the knee. Many clots removed from the joint. A finger was introduced behind the luxated patella from the side, and with exertion of considerable force it was lifted and returned to its position. The ruptured quadriceps tendon was not sutured, because this was regarded as a "complication" of the operation, and as preventing passive motion for weeks. Healing by first intention. Passive motion begun on eighth day. Entire recovery of all motions of the joint.

CASE V.—KUETTNER. *Zentralblatt f. Chir.*, No. 27, 1904, p. 168. "Demonstration eines Praeparates von horizontaler Luxation der Patella."

A woman sixty-four years old fell from wagon, receiving a penetrating wound of knee. Patella not to be felt. Suppuration of joint already begun. Amputation of thigh; death.

On dissection, patella found between outer condyles of femur and tibia, and rotated on its transverse axis. Quadriceps tendon, somewhat twisted, lay on outer surface of knee behind the femur, and had been perforated by the external lateral condyle. Articular surface of patella looked towards tibia. Ligamentum patellæ intact. Lateral and crucial ligaments ruptured.

The mechanism of the injury, author remarks, must have been a forced adduction of leg, causing joint to gape widely, while patella luxated outwardly and was forced into joint.

This case is similar to Szuman's, except for the fatal addition of a penetrating wound of the joint; and in this the patellar facets looked downward, in Szuman's upward.

In reviewing these cases, reduction is seen to have been accomplished only once by manipulation alone (Deaderick). In Midelfart's, Szuman's, Schmidt's, and my own, it was necessary to open the joint in order to free the patella. All of the operative cases healed by primary union, and the usefulness of the joint was recovered.

Midelfart and Deaderick speak of this variety of displacement as "Downward Dislocation," a term which has been perpetuated by some recent writers on surgery. It is evident, however, that this designation is but partially descriptive, and includes too much. The essential and distinguishing feature, viz., rotation on the horizontal axis, is omitted, while other dislocations without rotation on either axis might fairly come under this head. A more precise classification of patellar luxations in general would, therefore, be: Dislocation upward or downward, outward or inward; dislocation with rotation on perpendicular or horizontal axis, and combinations of these varieties.

The cases reported by Midelfart, Deaderick, Schmidt, and myself were dislocations with simple rotation on the horizontal axis. Those of Szuman and Kuettner present a complex of horizontal rotation and outward displacement, and must have been produced by a combination of forces.

THE MATAS OPERATION FOR ANEURISM.

REPORT OF A CASE OF POPLITEAL ANEURISM SO TREATED.

BY HERMANN B. GESSNER, M.D.,

OF NEW ORLEANS,

Demonstrator of Operative Surgery in the Tulane University of Louisiana.

A NEGRO, thirty-two years of age, was admitted to the Charity Hospital of New Orleans, June 21, 1904, with an aneurism of the right popliteal artery, involving the middle and lower portions of that vessel. The tumor was five inches in the long axis of the limb by four and one-quarter inches transversely. He gave a history of syphilis four years before, with one year's treatment. First noticed pain and swelling in the limb two months before admission.

June 23, 1904. With an Esmarch constrictor in position, an incision was made in the median line posteriorly; this exposed the internal popliteal nerve, which was retracted inward. The incision was now carried through the aneurismal sac. No clots whatever were found. The interior presented a thin layer of laminae and fluid blood. The lower opening was found early, being quite superficial and to the inner side; dark blood was escaping from it in small quantity. This opening, which was quite oblique, was at once sutured with a continuous Lembert suture of No. 1 chromic catgut. After a prolonged search, during which the sac was split up to its full extent, the upper opening was found directly above the lower at a distance of one inch. (The aneurism had evidently developed towards the anterior and external aspects of the artery.) It had been hidden from view by a fold of the sac; dark blood was escaping from this opening also. No. 3 chromic catgut was used in the form of a continued Lembert suture for the closure of this orifice. Removal of the constrictor was followed by escape of bright arterial blood above, showing either that the closure was defective or that some collateral existed, the opening of which (quite near by) had escaped detection. Complete hæmostasis was effected by a massive Lembert suture taking up at least an inch bite of sac wall on either side. The result

of this step was the firm approximation of the walls of the aneurism in the upper third, with a resultant approximation of the remaining two-thirds of the sac wall, so that no Neuberizing was necessary to do away with any dead space. A small iodoform gauze drain was introduced into this lower, unsutured portion of the aneurismal cavity. The skin wound was narrowed with silkworm gut. At the termination of the operation pulsation could not be felt in the dorsalis pedis. The usual aseptic gauze and cotton dressings were applied, with a cardboard gutter-splint posteriorly. The foot was elevated about four inches. First dressing four days later; a moderate infection existed; iodoform pack replaced by a smaller one. Foot warm; pulsation perceptible in dorsalis pedis. The infection diminished steadily; patient sat up July 21; on August 15 his wound was entirely well. There was no pulsation whatever; a slight tendency to cedema was observed.

Examination on September 3 showed the following condition of affairs: Patient in excellent health. General appearance of limb good; walks with a little stiffness (has been walking moderately since August 15); scar hypertrophied, with a little erosion due to friction of clothes and bad management of scab. Circumference of limb at middle of scar fifteen and three-eighths inches as against fourteen and three-eighths inches for opposite limb at same level. This difference is attributable to the hypertrophied scar on the one hand, and on the other to the presence of the aneurismal sac, which was left *in situ* at the time of operation. To the outer side of the lower quarter of the scar is a non-resistant swelling, which I take to be a venous dilatation, probably in the upper portion of the external saphenous. Neither here nor elsewhere in this region is there any sign of aneurism. Pulsation is palpable in the dorsalis pedis, not in the posterior tibial behind the malleolus.

Comment.—The writer had had not only the good fortune to read Dr. Matas's complete and lucid account of his method of treating aneurism by operative interference, but also the privilege of assisting him in at least two of his cases,—one femoral, the other popliteal. The good results observed after these operations, and the disastrous ones known to have resulted from other methods, led to the adoption of the method in the case now reported.

I believe this case to have borne out one of the important claims made for the method, viz., non-interference with the collateral circulation. It was evidently a case of recent origin, as shown by the fact that the patient, an intelligent man, had noticed it but two months before, and by the complete absence of clot, with but slight lamination. In spite of this recent development, but little time having been allowed for collateral circulation to develop, the limb was supplied with blood after operation, pulsation being observed in the dorsalis pedis at the end of four days. Again, the statement that a moderate degree of infection is not incompatible with success was confirmed; this fact makes the operation more generally applicable, not restricted to specialists operating under specially favorable conditions.

The technique varied but little from that described by Dr. Matas, the variation consisting in the fact that the walls of the aneurismal sac were brought together directly instead of being turned in on themselves after the method of Neuber.

LOSS OF ENTIRE LOWER LIP.¹

REPAIR BY FLAP FROM THE ARM.

BY STEPHEN WATTS, M.D.,

OF BALTIMORE,

Assistant Resident Surgeon, Johns Hopkins Hospital.

THE following case is that of a boy, fifteen years of age, who was admitted to the service of Dr. Halsted on July 6, 1904, with the history of having had his lower lip bitten off two days before by a circus pony with which he was playing.

On examination, the entire lower lip was found to be absent, even the periosteum of the lower jaw having been stripped off in places. The wound was clean and free from infection.

Considering the great extent of the wound, it was thought best to cover the defect with a flap from the arm rather than to attempt to obtain a flap from the face or neck. Accordingly, a large flap was dissected up from the right upper arm. This flap, which included skin and subcutaneous fat, was about twelve centimetres in width and eighteen centimetres in length. Its under surface and the raw surface of the arm, from which it was taken, were covered with grafts removed from the thighs. All of these grafts took well, and at the end of ten days we had a flap with skin upon both sides. Some of the skin upon its under surface was intended to form a substitute for mucous membrane upon the unattached portion of the lip, and to some extent prevent subsequent contracture.

The patient had a bad bronchitis for some time following this operation, and further operative procedure was thus postponed more than a month. During this delay, the flap, which had already become considerably shortened by the sloughing of its distal extremity, due to imperfect circulation, contracted to a wonderful extent. (Fig. 2.)

On August 18 we dissected up the flap somewhat farther, in

¹ Read before the Johns Hopkins Hospital Medical Society, October 17, 1904.

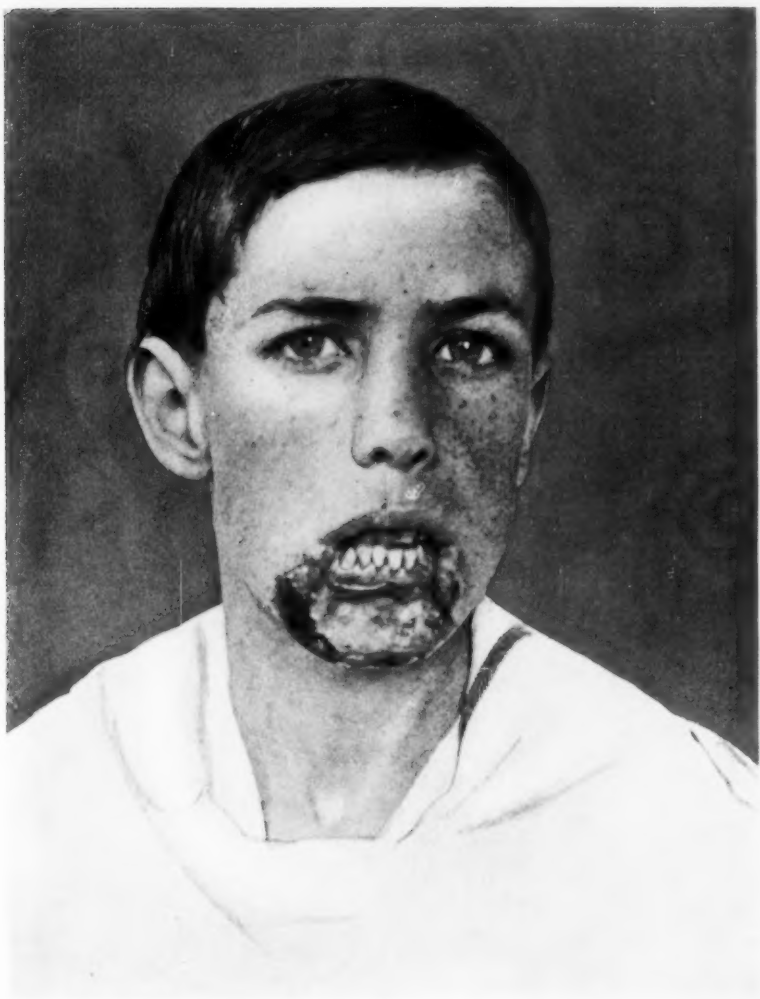


FIG. 1.—Condition before beginning treatment ; entire lower lip absent, exposing lower jaw.



FIG. 2.—Flap-prepared grafts upon arm and upon under surface of flap covered with silver foil.



FIG. 3 — Flap brought up to face. (Photograph taken on operating-table.)



FIG. 4.—Plaster bandage holding arm in place.

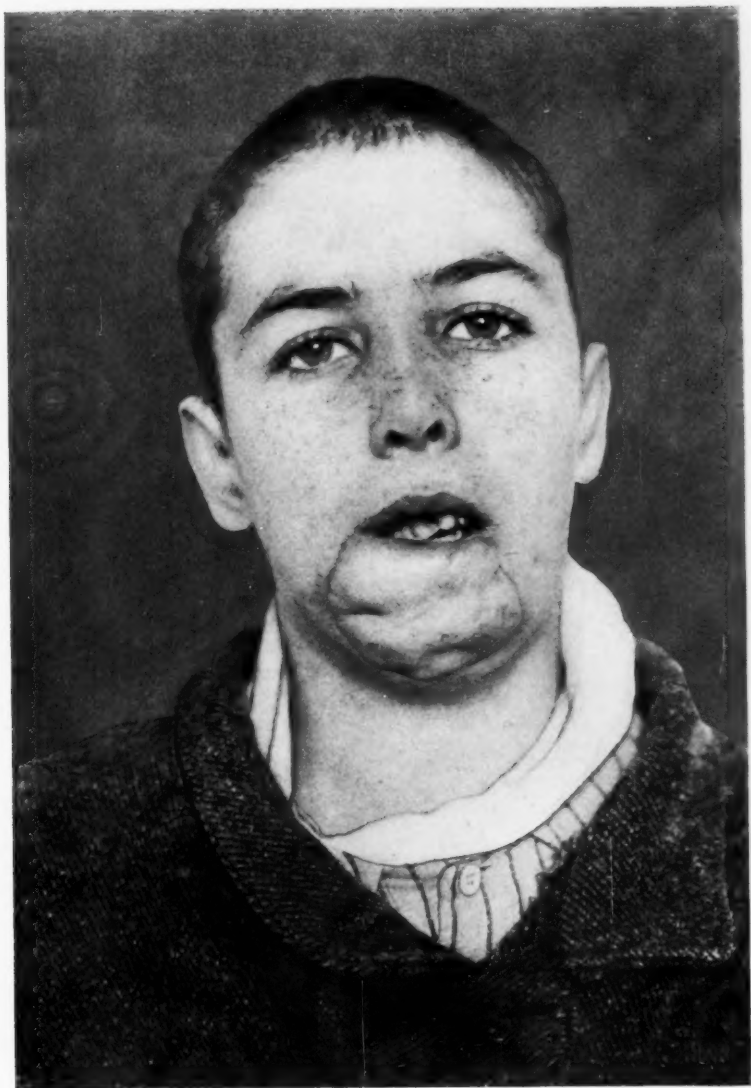
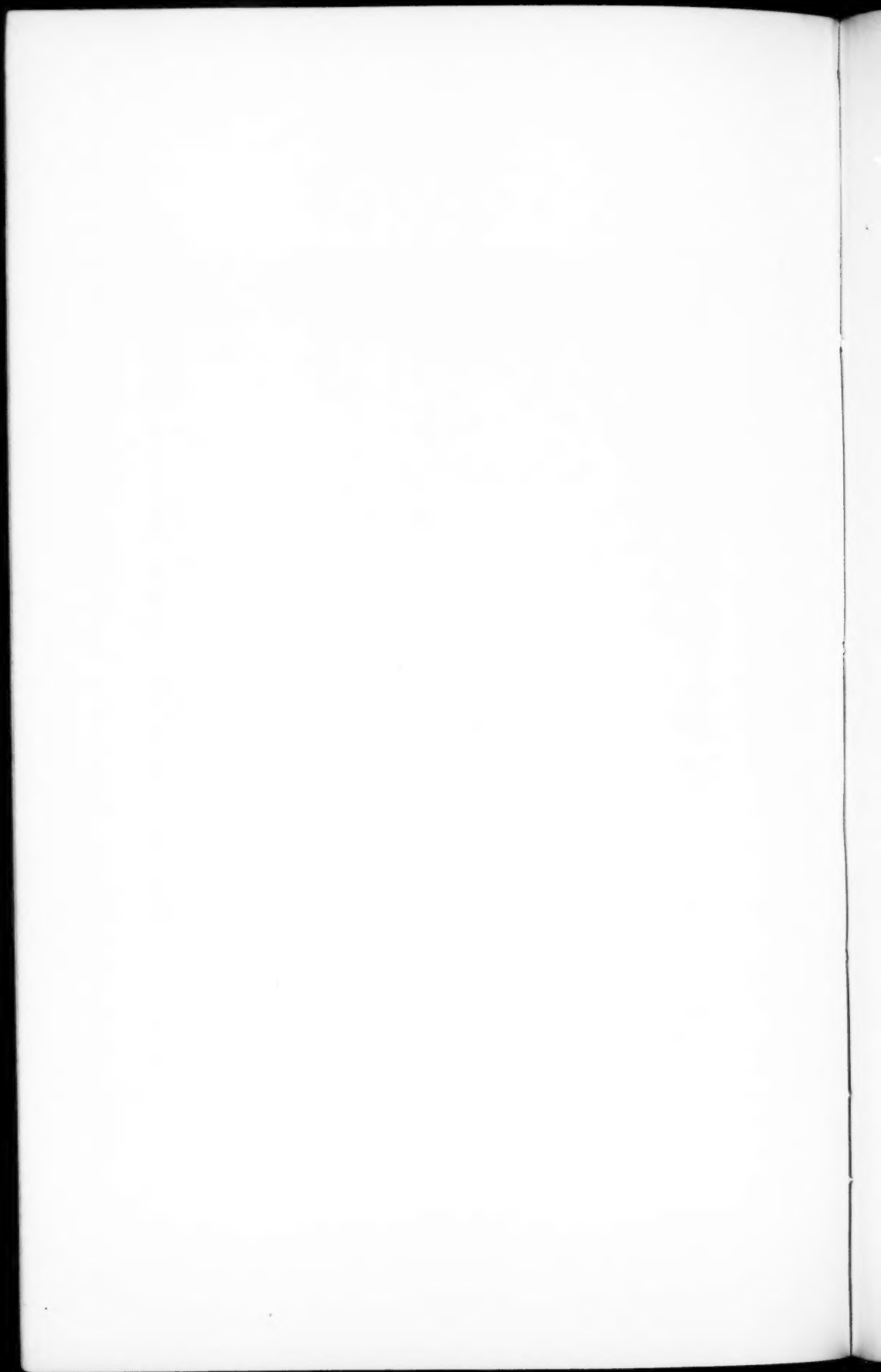


FIG. 5.—Final result.



order to lengthen it as much as possible, and then sutured its free extremity to the left side of the wound in the lip. A small portion of the vermilion border, which had been preserved on this side, was sutured along the upper edge of the flap.

The arm was held in place by means of a plaster cast for a period of about three weeks. The flap was then severed from the arm. This was done under local anæsthesia in several stages to allow the circulation to become more perfectly established.

The patient seemed very comfortable in the cast, the strained position of the arm causing almost no pain. At two subsequent operations, at intervals of two or three weeks, the lower and right borders of the flap were trimmed up and sutured in position. A very good functional and cosmetic result was thus obtained.

The accompanying photographs show very clearly the various stages of the operation.

A REGULABLE COMBINED DROPPING AND POUR- ING DEVICE FOR THE ADMINISTRA- TION OF ANÆSTHETICS.

BY VICTOR COX PEDERSEN, M.D.,

OF NEW YORK,

Anæsthetist to the Roosevelt Hospital; Instructor in Anæsthetics and Anæsthetist to the
New York Polyclinic Medical School and Hospital.

LONG ago the dictum has ceased to be a matter of dispute, that all medicinal agents act the most safely for the patient and the most satisfactorily for the physician, when their administration is graduated as accurately as possible in accordance with the susceptibility of the subject and with the desired degree of therapeutic effect.

In the field of anæsthesia, the first agent as to which this fact was established was chloroform. To use the exact words of Sir James Simpson, the original method of administration was to deliver the vapor "*powerfully and speedily*," in order to prevent the excitement incident upon slower procedure. So many deaths were the result of this technique, that by 1860, or about thirteen years after the anæsthetic value of chloroform was first applied to human beings, he recommended the drop-by-drop method of delivery. No one who is worthy of reputation for skill in anæsthetization has ever since that time departed from this mode of using this potent and withal rather dangerous general anæsthetic.

The great advantages of the drop-by-drop exhibition of chloroform are:

(1) *Determination of dose in accordance with susceptibility*; (2) *control of the amount of drug administered from moment to moment*; (3) *accurate variation in this amount at any period of the operation as indicated by the susceptibility, by the character of the operative technique, or by both*; (4) *greater safety of the patient*. The fourth item is inherent in the preceding three factors.

The manifest value of these elements of chloroform anæsthetization suggested application of the drop-by-drop procedure to ether narcosis and to anæsthesias produced by chloroform-ether mixtures or by other general anæsthetics. At the present time, therefore, the wisdom of drop-by-drop employment of general anæsthetics is not questioned, and the desideratum is established for *one* instrument which will combine regulability of dropping and pouring, if need should arise, as often does in the early stages of ætherizations, and which will be available for any other general anæsthetic or mixture of anæsthetics.

A large number of dropping fixtures and dropping bottles have been devised with the purposes of securing controllable drop-by-drop delivery. In the effort to design one which corrects all the disadvantages of the others, the regulable combined dropping and pouring attachment which is the subject of this paper has been produced after much experimentation.

The disadvantages of the metal dropping devices which have been corrected are the following: *First*, practically all others are so attached to their bottles that if the latter be broken a renewal cannot be made excepting, as a rule, through a surgical instrument house, and at rather great loss of time and much expense. The bottle of the author's attachment may be replaced by a common wide-mouth bottle at any drug-shop and in most households instantly and at practically no expense. *Second*, the parts of the droppers now on the market are in themselves usually so small, delicate, and complicated, that they are easily worn, damaged, and put out of order, and then require an instrument-maker for the repairs. The dropper of the author is small enough for neatness of appearance and convenience of packing and management, and sufficiently large to be durable and strong. The conical seating of the plug into the socket takes up the wear as it occurs. It cannot be damaged by any ordinary use or accident. It is extremely simple in construction and may usually be repaired by the owner. *Third*, the bottles of the usual droppers are so small that they are suitable only for chloroform. The four- and six-ounce bottles of the author's device are available for ether, chloroform, and their

mixtures, either of these sizes being furnished with the dropper as desired. *Fourth*, the dropping of the majority of fixtures is rather difficult to regulate, somewhat uncertain in action, and unexpectedly will change to a pouring. In the writer's instrument the dropping is accurately controllable, is with difficulty thrown out of adjustment, and nevertheless will deliver a stream by simply inverting the bottle, or turning the plug as a water faucet, as detailed later. *Fifth*, the corks of most of this type of bottle are specially cut and require skilled hands to replace when they become broken or damaged. Any good cork is all that is needed in the author's arrangement, and the hole may be cut into it with a standard cork-borer, such as is sold with the instrument if desired.

The standard glass chloroform drop-bottle has proved in the hands of the author the best of those now on the market, but its limitations suggested the instrument to be described. *First*, destructibility of the essential parts; *second*, rather high cost, especially in virtue of its fragility; *third*, difficulty of securing a bottle with stopper and neck carefully ground and with the flange of the stopper at a proper distance from the flange of the neck, so as to encourage dropping and discourage pouring. This distance should be about a sixteenth-inch; *fourth*, the particular tendency to pour unexpectedly which results from the fact that chloroform may trickle down both the upper or air and the lower or fluid slots, and thus overload the capillary space between the stopper-flange and the neck-flange. The bottle then inevitably pours.

The manner of obviation of these limitations has been described so far as the first two are concerned; the third is corrected by the adjustable disk on the plug of the writer's dropper as later detailed; and the fourth is corrected by the air-vent tube, whose free end is always above the fluid-level, and therefore makes pouring impossible unless the bottle is deliberately turned over so that the tube is submerged and becomes the exit of the contents, thus pouring, while air enters through the slots.

The parts of the dropper of the author are as follows: The *first* essential is a *socket* (Fig. 1) bearing a *flange*, with a

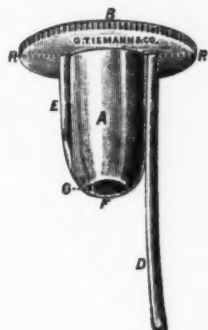


FIG. 1.—Socket without the cork.



FIG. 2.—Plug, flange, and lock-nut.

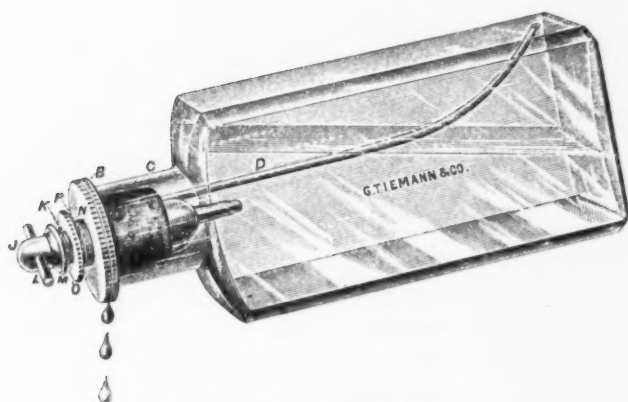


FIG. 3.—Dropper in action.

knurled edge (*B*, Figs. 1, 3), and an *air-vent tube* (*D*, Figs. 1, 3) piercing the flange. The *neck of the socket* has a conical *lumen* (*F*, Fig. 1), in whose wall opposite the air-vent is a groove (*G*, Fig. 1) extending upward two-thirds the length of the socket. On the surface of the flange indicating the axes of the groove and vent is the guide-line (shown in phantom *R*, Fig. 1), whose purpose will presently be shown. The *second* essential is the plug (*I*, Fig. 2). The neck (*K*, Figs. 2 and 3) is threaded for the disk (*N*, Figs. 2, 3) and its lock-nut (*O*, Figs. 2, 3). The disk is of the same dimensions as the flange of the socket. The body of the plug has two grooves (*Q*, Fig. 2) opposite each other, one wide for ether and the other narrow for chloroform. The pinion (*J*, Fig. 2) passes through the head in the axes in these grooves, therefore serving as an indicator of the position of the grooves and as a handle for turning the plug in the socket precisely as a water-faucet. The length of the grooves is such that when the plug and socket are assembled so that their respective grooves are apposed, they overlap each other, and thus form a tortuous channel into the cavity of the bottle, about one-eighth of an inch in diameter, which will deliver a stream large enough for all purposes. If now the plug is turned, its groove, *Q*, slowly moves away from *G*, decreasing the overlap until finally that is a mere capillary channel precisely in the manner of a water-faucet. The power of decreasing or increasing this outlet is the secret of determining the quantity of anæsthetic delivered,—copious, moderate, or small by any desired graduation. The fluid passes through the overlap into the relatively larger capillary space, *Q*, and then reaches the extensive capillary interval between the flange, *B*, and the disk, *N*. This arrangement constitutes a tortuous space always capillary, but largest at the edge of the disk and flange, so that fluid delivered into it through the overlap is compelled to spread out and therefore to drop. The whole success of the device rests upon this fact: a virtually funnel-shaped capillary space receives its fluid at the small overlap and compels it by capillarity to extend itself until the whole space is filled. Dropping then begins as the supply through the overlap

is delivered. The bottle never pours if this supply is correctly determined. The quantity of anæsthetic to be delivered rests upon the adjustment at the overlap. The manner of delivery thereof, namely, in large, slow drops, in large, rapid drops, in small, slow drops, in small, rapid drops, or in any intermediate graduation desired, rests upon the size of the space between disk and flange; the narrower this space is the smaller and more rapid will the drops be. After this detail is determined, the disk is locked by the lock-nut.

The assembling of the device is carried out as follows: The bottle is filled. The socket and cork are placed into the neck. The plug is then inserted into the socket in such a manner that the groove is opposite the guide-line on the flange, which brings the plug-groove and the socket-groove directly over each other. The disk is now run down the neck until it is a thirty-second-inch away from the flange. The capillary spaces are now filled by pouring; then the quantity of anæsthetic desired is determined by turning the plug to the right or left (as a faucet), and finally the size and rate of the drops are fixed by adjusting the disk. These details require a few seconds of time. When the adjustment is made, the bottle will drop by the hour without interruption or variation. At any moment it may be made to pour by turning it over so that the air-vent is submerged, or by turning the plug so that the channel is full-size, that is to say, so that the plug-groove and socket-groove completely correspond. The author has given the dropper the test of a full year's use in many cases of all kinds. In his hands it has never failed to work perfectly.

He desires to extend cordial appreciation and thanks to Messrs. George Tiemann & Co. for many valuable suggestions and kindly interest in producing this satisfactory instrument.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 12, 1904.

The President, HOWARD LILIENTHAL, M.D., in the Chair.

WOUND OF URETER DURING HYSTERECTOMY; ANASTOMOSIS; SUBSEQUENT NEPHRITIS; NEPHRECTOMY.

DR. F. TILDEN BROWN presented a single woman, forty years old, who was admitted to the Presbyterian Hospital on June 16, 1904. Her family history was negative. She had never had any children or miscarriages, and her previous history was good. Nine months ago her abdomen began to enlarge, without pain or other symptoms. This enlargement gradually continued. On July 21 a panhysterectomy was done for the removal of large fibroids of the uterus and broad ligaments, and during the operation the right ureter was divided. An immediate anastomosis was made, but a few days later urine began to discharge from the wound, and subsequently there was vesical irritability, with purulent urine, and at times involuntary micturition. The temperature ranged from 101° to 103° F. for two weeks, then from 100° to 101° F. until the fortieth day, when on July 30 it suddenly rose to 103° F. The patient complained of chilliness and pain in the right lumbar region. There was still some urinous discharge from the wound. The patient was weak and anæmic; the pulse was rapid and small, but regular. The right kidney was palpable and slightly enlarged; there was no tenderness; no rigidity. Leucocytes, 17,500. The urine contained pus and albumen and a few granular and hyaline casts. On August 2 the right kidney was exposed through a lumbar incision. It was found to be congested and partly adherent to its bed. After transfixing the pedicle, the

kidney was incised to allow the escape of blood and thus reduce its bulk, and was then excised. The stump of the ureter was cauterized after ligation. The opened fatty capsule was sutured to the transversalis fascia, and a cigarette drain inserted to base of wound. The patient made a rapid and steady improvement, and was discharged on the thirty-third day with a very small granulation at the lumbar scar and a small ventral superficial sinus. The pathological report was made by Dr. Tuttle, who stated that the kidney was much congested. There was slight round-celled infiltration and many casts.

TRAUMATIC RUPTURE OF URETER; EXTRAVASATION OF URINE; PYONEPHROSIS; NEPHRECTOMY.

DR. BROWN presented a boy, nine years old, who was admitted to the Presbyterian Hospital on July 2, 1904. His mother died of phthisis. The patient had always been delicate and had measles and diphtheria in infancy. Three weeks ago he was struck by a horse-car and caught under it, sustaining an injury to the left ilio-costal region. He was not unconscious, but vomited frequently. On the day of his admission two ounces of urine were obtained by catheterization. The urine contained a trace of blood. The abrasion on the left side of the abdomen partly healed, but on the opposite side a tumefaction appeared, thought to be a hæmatoma. The patient was discharged from the hospital on June 26, apparently well. Since then he had been up and about, but complained of some pain in the right side, and the right side of his abdomen was increased in size. He still had occasional attacks of vomiting.

The patient was readmitted to the hospital on July 2. At this time he was anæmic and poorly nourished, and a systolic basal murmur was made out. The abdomen was prominent and bulging in the right flank, with dulness outward from the median line and dilated veins over the tumor, chiefly above the level of the umbilicus. Bimanually, a fluctuating tumor could be distinctly outlined just below the tip of the ninth cartilage, not moving with respiration. There was some tenderness over the mass. A rectal examination was negative. An X-ray picture of the trunk, the injection of tuberculin, and the transmitted light test were all negative. Temperature on admission, 99° F.; pulse, 96. Leucocyte count, 14,000. The urine was 1030; acid; no albumen, casts, nor blood cells. No tubercle bacilli.

On account of the small caliber of the urethra, a cystoscopic examination was made under full anæsthesia. The bladder was seen to be normal. The ureteral catheter entered the left ureter rapidly and emitted normal urine. The mouth of the right ureter was open, but ureteral catheters of the smallest size and with different shaped tips would not pass beyond three-quarters of an inch, and no urine flowed from the catheter. From this it was inferred that the ureter was occluded or ruptured, and that the tumor was due either to a greatly distended renal pelvis and kidney, or to an extrarenal accumulation of urine. Subsequent developments showed that the latter was the case, and that the ureteral lesion giving rise to the extravasation was a lateral rent at a point one and one-half inches from the hilum. An explanation of the ureteral occlusion at a point three-quarters of an inch from the vesical papillæ was never obtained.

On July 7, through a right lumbar oblique incision, a retro-peritoneal cystic tumor was opened, and thirty-six ounces of urinous fluid evacuated. The kidney and its adipose capsule, which were found forced well above the site of the accumulation, were now drawn down into the wound, and the fatty envelope examined for a rent. None being found, it was opened to expose the kidney, which was apparently normal in appearance. The site of the lesion giving rise to the urinary extravasation had not been determined thus far, but the occluded lower end of the ureter was suspected as being in some way responsible. The wound was partly closed and drained. There was a free urinous discharge from the wound. The temperature remained normal until the sixteenth day, when it rose to 103° F. The patient vomited and had a very severe frontal headache. The right kidney was palpable and somewhat tender.

On July 28, through a right iliac incision, an attempt was made to reach the kidney; but this proved inadvisable, because, on trying to reflect the parietal peritoneum, it was torn, due probably to pathological conditions resulting from the previous extravasation. This wound was then closed with chromic gut and the former right lumbar incision reopened and enlarged. The kidney was exposed, and on stripping off the fatty capsule the cortex was found to be covered with slightly raised yellowish-red and purplish lesions. After freeing the kidney and before ligating the

ureter, a quarter-inch rent was discovered about an inch and a half from the hilum. Through this a little urine could be made to escape upon squeezing the kidney, and a probe passed through it entered the renal pelvis. The pedicle was transfixed, ligated in three separate parts, clamped and cut, and the kidney removed. The cavity was irrigated and the opened fatty capsule held by sutures to the transversalis fascia. A single cigarette drain led to the pedicle, and the wound was almost closed with chromic gut. In the second and third days, from thirty-five to forty-five ounces of urine were passed. All discharge from the wound ceased on the tenth day. The patient was discharged on the twenty-second day after the nephrectomy, with only a tiny granulation at the site of the wound. The pathologist reported an extensive infiltration of leucocytes in streaks out through the cortex, evidently the result of an ascending inflammation. The kidney pelvis was congested.

NEPHRECTOMY FOR RENAL TUBERCULOSIS.

DR. BROWN presented a man, thirty years old, who was admitted to the Presbyterian Hospital on July 1, 1904. His family history was negative. He was addicted to the moderate use of alcohol. Three years ago he had syphilis, for which he was under treatment for two years. There was no history of gonorrhœa nor other illnesses.

Six months ago he began to suffer from frequency of micturition, with some blood at the end of the act, and pain at the head of the penis. He was treated at Mt. Sinai Hospital and was soon able to return to his work. Ten weeks ago his symptoms recurred, and the bleeding was more severe. Six weeks ago he was compelled to take to his bed, and in addition to his other symptoms he suffered from diarrhœa and pain in the right lumbar region.

On admission, the patient was micturating about five or six times at night. The urine contained so much pus that it was almost milky. There was slight tenderness over the right kidney. No tumor could be felt. By rectal examination a softened area in the prostate could be made out. By the three-glass test the first urine passed was turbid with pus, the second more so, and the third and last almost the consistency of soup. It also contained a heavy trace of albumen. The patient's temperature

ranged from 100° to 103° F. daily. He was poorly nourished, anæmic, sallow, and apathetic. The superficial glands were enlarged.

The case was regarded as one of suppurative seminal vesiculitis on the left side, and on July 12, through an inverted Y-incision in the perineum, the bulb was exposed, and upon further dissection the distended left seminal vesicle came into view. As an aspirating needle gave no fluid, the vesicle was incised, but only normal appearing seminal fluid escaped. This sac was evidently not the source of the patient's pyuria. A very small cigarette drain was placed in the vesicle, and a larger one between the rectum and prostate, and one-half of the wound closed with chromic-gut sutures. The following day the patient's urine showed the same extreme pyuria as formerly.

On July 19 cystoscopy was done under local anaesthesia. A patch of ulceration, covered with adherent muco-pus, was seen about the right ureteral orifice. The irregularities due to the ulceration made it impossible to introduce a catheter, but the picture was typical of an associated renal tuberculosis. There were no other vesical lesions. The left ureter was readily catheterized and gave a clear amber urine, which on examination was found to be normal. For the next ten days the patient's urine was frequently examined for tubercle bacilli, but with negative result. The perineal wound healed rapidly. The patient complained of occasional right lumbar pain, and his temperature became more elevated.

On August 6 the kidney was exposed through a right lumbar incision. It was found to be firmly adherent. The pedicle was transfixed serially with chromic gut, the ureter divided and tied, and the stump cauterized. The kidney was large, with yellowish lobulations containing pus. When the pedicle was divided, thick pus escaped into the wound. After removing the kidney, remnants of the pelvis were trimmed off the pedicle and the split capsule stitched to the transversalis fascia. A single cigarette drain was introduced and the wound partially closed. The patient improved rapidly in weight and strength, and was discharged cured on August 25, 1904. The kidney was five inches long, and tubercles were found on the surface. All the pyramids contained abscess cavities.

NEPHRECTOMY FOR CALCULOUS PYELONEPHROSIS.

DR. BROWN also reported the case of a colored widow, forty-three years old, who two years ago began to complain of frequency of micturition; pus was found in the urine. There was also loss of strength, headache, and vomiting. Three months ago a swelling was noticed in the right side. This proved to be an easily palpable circumscribed tumor occupying the entire right lumbar region, almost to the umbilicus. The urine was cloudy and contained albumen and pus. The left ureter was catheterized and gave a clear, dark, amber urine. From the right ureter no urine was obtained, but no obstruction was encountered even when a long catheter was passed apparently into the kidney pelvis. Upon removal of the diseased kidney, it was found to contain little renal tissue. There were many large pockets of pus, and nearly all the pyramids were destroyed by intrarenal pressure. A pointed calculus fitted snugly into the ureter, with branches reaching into several of the calices. The patient made an uneventful recovery.

DR. SAMUEL ALEXANDER said that in his experience renal tuberculosis frequently gave rise to symptoms, viz., frequent urination and pain at the end of micturition, pointing to disease of the bladder and seminal vesicles, without actual involvement of those organs.

DR. BROWN said that frequency was a symptom probably present in 90 per cent. of the cases of renal tuberculosis that had come under his observation. He thought it important for the profession at large to remember that symptoms of bladder irritability do not necessarily indicate disease of the bladder, although in the majority of cases of renal tuberculosis the corresponding ureteral papilla is hyperæmic, œdematous, and more or less ulcerated. While this condition of the ureter mouth is an additional and aggravating cause for frequency, the same symptom has been present in a few cases where this associated vesical lesion did not exist; and it would seem as if the nature of the tuberculous elements descended from the kidney gave rise to the bladder irritability rather than any reflex innervation from the kidney.

STONE IN THE PELVIC PORTION OF THE URETER.

DR. GEORGE E. BREWER presented a man, fifty-two years old, who was referred to the speaker by Dr. Frank H. Whittemore, of New Haven. After a period of ill-health lasting about six months, the patient had an attack of renal colic on the right side. From this he recovered, but six weeks later he had another severe attack, which in passing off left a good deal of soreness persisting for several days. Examination showed a point of decided tenderness about one inch above the external abdominal ring. Palpation in the region of the kidney itself was negative. The patient stated that during his two attacks the pain radiated down into the groin, as in stone in the kidney. The cystoscopic examination was negative, other than the fact that the right ureteral orifice was a little prominent. Examination of the urine was negative. An X-ray examination showed a stone in the pelvic cavity, about half an inch from the spine of the ischium. A diagnosis was made of stone lodged low down in the ureter, and an operation advised. Under ether anæsthesia an eight-inch abdominal incision was made above and parallel with Poupart's ligament, dividing the various layers until the subperitoneal space was reached and the iliac vessels exposed. The ureter was followed downward. It was found moderately thickened below the brim of the pelvis, and, on account of the dense adhesions, was recognized with difficulty. No stone could be detected. An incision was then made in the ureter and a flexible sound introduced and passed downward. This was arrested at the bladder wall. After a prolonged search with the finger, a stone could be felt low down in the ureter. In order to extract it, a second incision was made in the ureter, very low in the pelvis. After removal of the stone, the two incisions in the ureter were carefully closed; the external wound united by layer suture, leaving a cigarette drain leading down behind the peritoneum. The operation, which required an hour and forty-five minutes, was not followed by any reaction, and the patient made an uneventful recovery. There had been no recurrence of his symptoms.

In reply to a question, Dr. Brewer said that, as a rule, in these operations the ureter was lifted with the peritoneum, with which it was in intimate relationship; but in this particular case it was held down by adhesions to the underlying structures. In a case

of ureteral calculus that he reported about a year ago, tenderness was elicited by rectal palpation, but that symptom was entirely absent in this case.

In reply to a question as to what course he would pursue in a case where the X-ray disclosed a calculus in each ureter, Dr. Brewer said that he had such a case under his observation. The patient was a woman, and he advised her to drink large quantities of Poland water. She did so, and under this treatment the pain on one side had disappeared, although it was still very severe on the other. He intended to take another X-ray picture, and if this showed that one of the stones had disappeared, he would advise operating on the ureter that was still occluded.

Dr. BROWN said that in some cases the presence of a fair-sized stone or several stones in the ureter interfered very little apparently with the access of urine to the bladder, and any appreciable hydronephrosis was often absent.

The speaker reported the case of a man, seventy years old, who for two years had complained of symptoms pointing to bladder involvement. There were some pyuria, frequent urination, and a bladder that was intolerant of more than one ounce of any irrigating fluid. He suffered some pain and increased irritability if driving, which had been given up on that account. Several surgeons at different times had inferred that these symptoms were due to "cystitis," "vesical calculus," "enlarged prostate."

Dr. Brown's examination satisfied him that neither of the last two existed, and, suspecting ureteral calculus, had several skiagraphs made by two different experts; four of the plates were corroborative, and showed five calculi in the lowermost part of the left ureter, and two at a higher level in the right. An unsatisfactory cystoscopy suggested a tumor referable to the left ureter, and was adjudged a prolapsus of this tube, due to the stones. This inference was supported by the fact that the row of five stones was at a decided angle with the normal direction of the ureter, and that all the stones were much nearer the median line than was the normal position of a ureter mouth.

In another case, where symptoms of ureteral calculus had persisted for fourteen years, there was no hydronephrosis. Here an X-ray-plate showed four calculi in the lower part of the left ureter.

Dr. Brown was asked to catheterize the ureters, and was able

to pass the finest catheter beyond at least one, if not more, of the stones, and he injected a sterile solution. Whether because of this examination or a mere coincidence, the patient nevertheless passed all of the stones from the bladder and handed them to the expectant surgeon when about to operate two days after the ureteral catheterization.

DR. BREWER said it must not be assumed that every shadow disclosed by the X-ray in the region of the ureter was a stone. It had been shown by Leonard that certain small shadows in this region resulted from the presence of phlebolites or calcified lymph glands.

DR. LILIENTHAL said that in a case where the radiograph gave shadows that looked like stones, and the patient gave symptoms pointing to the presence of calculi, it was pretty safe to assume that we had to deal with calculi. In addition to the possible sources of error mentioned by Dr. Brewer, namely, phlebolites and calcified lymph nodes, there was one other that he had seen illustrated in a case of suspected ureteral calculus. The picture gave a shadow that bore a close resemblance to a calculus, but Mr. Caldwell, who took the X-ray, said he was convinced that it was not a stone, but a sesamoid bone, such as sometimes occurred in one of the obturator tendons.

SOME OBSERVATIONS ON PROSTATIC ABSCESS.

DR. SAMUEL ALEXANDER read a paper with the above title.

DR. BROWN said that, in his experience, prostatic abscess was comparatively rare. He could recall, perhaps, four or five cases, and in two of those rupture had already taken place into the ischiorectal fossa.

DR. LILIENTHAL said that, in opening a prostatic abscess, he could see no advantage in opening the urethra; this, on the contrary, was rather a disadvantage, unless one had to deal with an old chronic abscess, and a fistulous opening into the urethra, where it would be advisable to curette and drain. In an ordinary acute case of prostatic abscess he favored the old-fashioned way of going in directly through the perineum into the capsule of the prostate and draining. This method was rapid and safe, no traumatism was inflicted on the urethra, and it was not necessary to pass any sounds. The speaker said he saw no serious

objection to opening the capsule of the prostate: he had done this in quite a number of cases, and had never seen any harm result, and in those cases where the abscess was still intraprostatic the cure was particularly quick and thorough. The kind of incision made very little difference, excepting that the curved von Dittel incision gave better chances for drainage. Dr. Lilienthal said he had always carefully and studiously avoided opening the urethra in operating on these cases, on account of the possible danger of the formation of a permanent suppurating sac. Nowadays, no one would open such an abscess through the rectum.

Dr. ALEXANDER, in closing, said the reason he did not like to open an abscess of the prostate through the capsule was because in all the cases upon which he had operated, as well as in those which he had seen in other hands, there was already, at the time of operation, an opening from the urethra into the abscess, or else such an opening occurred subsequently. In the vast majority of the cases the mucous membrane of the prostatic urethra was already so much diseased that an opening was unavoidable. Dr. Alexander said that the point at which he opened these abscesses was near the apex of the prostate, and in every instance he tried to make the floor of the abscess cavity absolutely flush with the floor of the urethra, and leave no pockets. The operation could usually be done within fifteen minutes. In some cases there was considerable hæmorrhage, necessitating the packing of the wound, but this was exceptional, as a rule, the hæmorrhage was no more than when the opening was made through the capsule. The disadvantage of opening through the capsule was, that if at the same time there was an opening into the urethra a permanent perineal fistula was more often the result. As to the frequency of prostatic abscess, the speaker thought the condition was common, but often existed without being recognized. During his absence from the hospital last summer, his associate, Dr. Edgerton, had operated on at least twenty cases.

Stated Meeting, November 9, 1904.

GEORGE WOOLSEY, M.D., in the Chair.

NECROSIS OF INTESTINE FOLLOWING TRAUMATISM AND
LOCAL SEPTIC PERITONITIS.

DR. JOHN A. HARTWELL presented a man of forty-five years who was admitted to the Hudson Street Hospital on June 19, 1904. He was brought to the hospital by ambulance, having been found in a stuporous condition in the street. On the following day he stated that he had been sick for three days with epigastric pain, vomiting, and constipation. He denied all history of a trauma, but as he showed marked evidences of alcoholism, this statement counted for nothing. On admission he had a temperature of 100° F.; pulse, 84; respirations, 52. The abdomen was rigid and tender, particularly in the epigastrium. Otherwise the examination revealed nothing abnormal. An operation was done a few hours later by Dr. Benjamin T. Tilton. Through a median incision below the umbilicus the peritoneum was opened, and the abdominal cavity was found to contain a large quantity of sanguinopurulent fluid. There was considerable contusion of the mesentery, with a rupture of one or two vessels, which were still bleeding. A contusion of the jejunum extending over an area of about one foot was also present, and in one or two places the external coats of the intestine were torn through, leaving the mucous coat intact. Over these exposed areas the peritoneum was brought together with Lembert sutures, the bleeding vessels in the mesentery were ligated, and the rent in the mesentery sutured. The question of resecting the gut was decided in the negative, in the hope that it would recover, and after cleansing the cavity the wound was closed, with drainage. The intestine remained intact for one week, when a faecal fistula formed. This failed to close, and the patient's poor condition precluded further operative measures at that time. He became septic, and developed a large abdominal abscess near the wound, and others in the ischio-rectal region, and later in the scrotum. These were all suc-

cessfully treated, and he began to gain, despite the fistula high up in the intestine.

On August 7 of the present year the patient was referred to Dr. Hartwell at Bellevue Hospital, through the courtesy of Dr. Bolton, for the purpose of closing the fæcal fistula when his condition would warrant it. After two weeks of rectal feeding and careful attention to the abdominal wound, during which period the patient had continued to improve, an operation for closing the fistula was undertaken. At this time the septic condition had entirely disappeared.

The usual elliptical incision was made around the intestinal opening into the peritoneum through comparatively healthy parietes. The intestine was found to be completely divided transversely, with the proximal end projecting through the skin, and the distal end buried and occluded by a mass of adhesions inside the peritoneal cavity. The two ends were freed, freshened for a short distance, and sutured by two rows of Lembert sutures. In an attempt to break up the adhesions, a rupture was made in the gut about six inches below this point, and this was closed in the same manner. An examination of the intestine above the first division showed a length of about four inches, matted in adhesions, that was on the verge of complete necrosis, and the slightest handling of which produced a tear through the whole thickness of the wall. This peculiar condition had evidently existed for more than two months, that is, from shortly after the occurrence of the original injury. The damaged gut was resected for a distance of five inches in the usual manner, and an end-to-end anastomosis made with simple Lembert sutures.

The patient's further convalescence was uneventful. The bowels moved spontaneously on the third day, and there was never any discharge of fæces from the wound. He was fed entirely by rectum for four days, when diet by mouth was instituted and gradually increased. The interesting factor in the case was the failure of the intestine to either recover completely its circulation and vitality or to become gangrenous within a short time after the injury, and the associated peritonitis. Neither of these conditions developed, but a progressive necrotic process ensued, which sooner or later must have ended in gangrene had the affected portion not been resected.

DR. BENJAMIN T. TILTON said that when the patient first

came to the Hudson Street Hospital he showed very few of the symptoms that were usually associated with injury of the abdominal viscera. He had been on a spree for two weeks, and denied all knowledge of any injury. He complained of pain in the abdomen, which he stated had come on about four days ago. The mild temperature elevation and the rapid breathing were attributed to a pleurisy, with slight effusion which was present. A rectal examination, however, revealed a mass which upon opening the abdomen proved to be due to an agglutination of the intestines. The latter were covered with lymph. Further inspection showed a contusion of the jejunum at several points and a rupture of one of the branches of the mesenteric artery, which was tied. The patient's condition at that time was so poor that an anastomosis was not deemed advisable. Perforation of the gut was feared, and subsequently it occurred, resulting in a faecal fistula.

RUPTURE OF THE PLEURA AND LIVER.

DR. FORBES HAWKES presented a girl, eight years old, who first came under his observation on October 5, 1903. The history obtained was that forty-three hours previous to that date the child had been run over by a wagon, one of the wheels passing over the lower part of the chest. The injury at first was not regarded as serious, for she apparently recovered from her shock shortly; but the symptoms then gradually became worse, and when Dr. Hawkes saw her the pulse was weak and rapid (120-130); she was somewhat anæmic; there was an ecchymosis over the right chest, and both recti muscles were fairly rigid. The abdomen evidently contained some fluid. There was slight dulness over lower part of right chest. A provisional diagnosis of rupture of the liver and hæmorrhage into the peritoneal cavity was made, and the abdomen was opened directly over the region of the gall-bladder. The peritoneal cavity was filled with blood-clots and a brownish-green fluid, showing the presence of bile. Further examination revealed a rupture of the liver into which three fingers could be inserted. This wound was still bleeding, and in order to check the hæmorrhage a large dry pad was introduced and pressure exerted for about five minutes. A cigarette drain wrapped with rubber tissue was then inserted down to the wound in the liver.

The patient rallied well after the operation, but for several weeks afterwards her temperature ranged from 101° to 102° F. and her pulse from 138 to 160. Then the temperature began to go still higher, and there was considerable abdominal pain, with some distention. On October 16 the area of dulness over lower right chest was found to be increasing. A needle was inserted and some gelatinous-like substance withdrawn. About twelve hours later the chest was opened, a section of rib removed, and a small drainage tube inserted. This was unfortunately removed at the end of twelve hours. The temperature, which had been up to 104° F., gradually fell, and the patient got along fairly well until October 23, when signs of sepsis became noticeable. Her temperature again became elevated, and there was considerable pain over the region of the liver. The previous incision in that locality was enlarged, but the wound was found absolutely clean. A second incision was made later posteriorly over the right chest, opening into a small pleural pus cavity walled off by adhesions. On December 20 further sections of the ribs were removed, and counter-drainage instituted, after breaking up all adhesions in the pleural cavity. Following this the temperature rose to 106° F., but soon fell to normal, and there was no further trouble. Under proper exercises, the lung had since expanded, and the patient was now enjoying excellent health. She undoubtedly had a rupture of the pleura together with the rupture of the liver.

BULLET WOUND OF PLEURA, LUNG, DIAPHRAGM, AND LIVER.

DR. HAWKES showed a bullet that had passed through a patient's pleura, lung, diaphragm, and liver, and had lodged to the inner side of the upper pole of the right kidney, carrying with it four pieces of clothing. Recovery followed operation for hæmorrhage from the liver.

SOME CONSIDERATIONS REGARDING WOUNDS OF THE LIVER.

DR. BENJAMIN T. TILTON read a paper with the above title, for which see page 20.

DR. ALEXANDER B. JOHNSON said his experience in regard to the treatment of wounds of the liver had been very similar to

that related by Dr. Tilton. His personal experience had been limited to five operative cases, two of which he had presented to this Society. In one of the cases there was a rupture of the lung, kidney, and liver: in that instance the liver was torn away from its attachments to the diaphragm, and in order to reach the wound it was necessary to divide the suspensory ligament. This having been done, packing was introduced between the liver and diaphragm, and the liver itself was lifted upward by a mass of packing underneath. The patient, a child, recovered. In another case of rupture of the liver resulting from a run-over accident in a man, the diagnosis was made of shock due to an internal injury. In this case the rupture extended to the posterior border of the lower surface of the liver, and it was impossible to stop the hæmorrhage by packing, and the patient bled to death. In a similar case, Dr. Johnson said, he would be inclined to crowd in a large mass of packing in front of the liver, after first cutting the suspensory ligament. By this method the hæmorrhage might possibly have been checked. Incised wounds of the liver, the speaker said, where they could be reached, could usually be successfully treated by suture. In another case coming under his observation there was a rupture of the superior surface of the liver; a chronic peritonitis resulted with the formation of adhesions between the anterior border of the liver and the abdominal wall, giving rise to considerable exudate of bloody serum and liver tissue. The diagnosis was made of probable abscess of the liver on account of the apparent increase in the size of the organ. The drainage of the cavity resulted in recovery.

DR. GEORGE E. BREWER referred to two cases of severe visceral lesions resulting from abdominal contusions in which there were very slight evidences of shock. In one case of complete rupture of the spleen the man was able to walk two miles after receiving his injury. In another case, that of a railroad man who was caught between the buffers of two cars and sustained a rupture of the right lobe of the liver, the early symptoms were very slight. Dr. Brewer said he cited these two cases because Dr. Tilton had made the statement that in those instances where the symptoms of grave shock were absent, the treatment should be expectant. Severe intra-abdominal hæmorrhage not infrequently occurs with very slight symptoms of shock in the early stage.

In regard to the possibility of remote consequences from injuries of the liver, Dr. Brewer said his attention had recently been called to an article by Kehr, in which the writer described a condition of hepatic apoplexy, a hæmatoma of the liver substance from apparently slight injury. This hæmatoma might become absorbed, or it might become infected and give rise to an abscess which might develop very rapidly and produce marked symptoms of sepsis. Last spring, Dr. Brewer said, he was called to operate in a case of supposed acute intestinal obstruction. The patient had had a sudden rise of temperature, with tympanites, pain, muscular rigidity, vomiting, and obstinate constipation. A gradually increasing area of hepatic dulness was found, into which a needle was finally introduced through the back, and a syringe of chocolate-colored fluid withdrawn. This was found to be composed of blood and pus. Subsequently, a rib was resected, and on going down through the diaphragm into the liver an abscess was reached and a pint of dark-colored pus evacuated. From this patient the history was afterwards obtained that three months before she had been thrown from her horse, striking on her right side. It was probably one of those cases where a hæmorrhage into the liver substance had become infected.

DR. OTTO G. T. KILIANI said he had seen two cases of wounds of the liver in which he had met with great difficulty in checking the hæmorrhage. He referred to an apparatus for stopping the bleeding in these cases by means of hot air or steam.

DR. GEORGE WOOLSEY said he agreed with Dr. Brewer that very slight evidences of shock were sometimes observed in cases of severe visceral injury, and that exploratory operation was indicated in case there was any serious suspicion of such injury. In cases of injury of the liver he had found packing effective in stopping the hæmorrhage. He mentioned a case of injury of the liver in a four-year-old child that had been run over. Examination showed a deep and narrow wound of the liver near the transverse fissure. There was a great deal of hæmorrhage into the abdominal cavity. On picking up what seemed to be a ruptured vessel, it proved to be the common bile duct completely ruptured near its lower end. This was implanted into the duodenum with a few fine silk sutures. For a few days after the operation the stools were bile-stained; then the bile began to flow quite freely through the external wound alongside the cigarette drain, while

the stools gradually became paler, until they were clay-colored. By the end of the second week, as the patient was evidently losing ground, and a second operation was undertaken, cholecystenterostomy was performed, but the attempt to find and tie off the duct had to be given up on account of the adhesions and the poor condition of the patient. The patient died within twenty-four hours after the second operation. Such an injury is very unusual, and no case has been met with in medical literature where a primary radical operation has been done in such a case. As a result of his experience, Dr. Woolsey is convinced that the preferable procedure in such a case would be cholecystenterostomy with ligature of both ends of the ruptured duct.

DR. TILTON, in closing, said he agreed with Drs. Brewer and Woolsey that severe visceral injuries might be present without giving rise to early severe symptoms. Even these cases could usually, however, be recognized by the presence of some local symptom or by some subsequent development. Unless distinct evidences of injury could be made out, the speaker said he was inclined to wait before operating until dulness indicated the presence of blood, or until the onset of other symptoms rendered a laparotomy advisable. Of course, in the presence of marked symptoms at the outset, an operation should be done as soon as possible.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 3, 1904.

The President, HENRY R. WHARTON, M.D., in the Chair.

LARGE MULTILOCLAR OVARIAN CYST; OPERATION; THROMBOSIS OF THE RIGHT PULMONARY ARTERY; DEATH.

DR. ROBERT G. LE CONTE reported the case of a woman, aged sixty-four years, who was admitted to the wards of the Pennsylvania Hospital, December 21, 1902, under the care of Dr. Scott, with an abdomen enormously distended, dome-shaped, and very tense. From the umbilicus upward the superficial veins prominent, but no œdema of the skin. From umbilicus downward no veins visible; skin quite œdematous, pitting on pressure. The entire abdomen from the ensiform cartilage down was dull over the anterior aspect, but above the iliac crests and in the flanks there was a high-pitched tympanitic note. Distinct succussion wave. Both legs very œdematous, the left a little more so than the right, with great dilatation of the smaller veins and capillaries, giving the legs a rosy appearance. Urine, amber, cloudy, brownish precipitate, acid; specific gravity 1010; marked amount of albumen; no sugar; quantities of pus and epithelial cells, hyaline casts, and a few small granular casts. Blood hæmoglobin, 88 per cent.; white blood-corpuscles, 16,200.

A trocar and cannula were introduced two inches below the umbilicus in the median line; no fluid was withdrawn, but after the cannula was removed a small amount of gelatinous material exuded from the wound. The trocar was again introduced at

another position in the median line with the same result. The next day a three and one-half-inch trocar was introduced to the hilt, and again failed to draw any fluid, although a gelatinous material exuded on its removal.

December 27 the abdomen was opened in the median line. An ovarian cyst immediately presented, which filled the entire abdominal cavity, and was adherent to the parietal peritoneum, liver, spleen, intestine, etc. It showed three trocar openings from which gelatinous material was exuding. Quite a large quantity of this material was found free in the peritoneal cavity, the cyst not being adherent in the region of the trocar openings. The cyst was opened, and as much of this yellowish, gelatinous material scooped out as possible; the adhesions to the surrounding organs broken up, the pedicle ligated, and the cyst removed. Several quarts of the gelatinous material were then removed from the peritoneal cavity, but, as all the organs within the abdomen were thickly coated with it, its stickiness made it impossible to remove it all, and quite a large amount was allowed to remain. The incision was closed without drainage. The total weight of the material removed, together with the cyst wall, was estimated at about sixty pounds. The patient's condition during operation was at times very poor, but she seemed better at the close of the operation than at the beginning. Reaction was good, and for several hours her condition was quite good; pulse slow and of good volume; respirations normal. At 11 P.M., without any prodromal symptoms, she suddenly became very restless, gasping for air, with failure of the pulse, and death ensued in a few moments.

The pathological report of the specimen showed it to be a multilocular ovarian cyst, with locules ranging from the size of a hickory-nut to the enormous one which was opened at operation. The contents of the tumor were for the most part a clear, yellowish, sticky, jelly-like substance, with occasional streaks of pure white, and again in small areas portions which were blood-stained.

A post-mortem examination was made fourteen hours after death, in which the findings were briefly as follows: Thrombosis of the right pulmonary vessels; general arterial sclerosis; general old adhesive peritonitis; broncho-pneumonia; chronic endocarditis; cirrhosis of the liver; chronic perihepatitis; diffuse nephritis; perisplenitis, etc.

On section all the lobes of the right lung have a dry, pinkish-

gray surface. The vessels are filled with a firm, mostly red laminated clot, which is adherent to the vessel walls in places, but which can be detached and removed as a tree. The descending aorta is the seat of several thickened patches of sclerosis, from one to three centimetres in size. That vessel and the iliac arteries are free from clots. The heart contained fluid blood and no clots.

ACUTE APPENDICITIS; OPERATION; SEPTIC THROMBOSIS OF A BRANCH OF THE RIGHT PULMONARY ARTERY, FOLLOWED BY ABSCESS OR GANGRENE OF THE LUNG; DEATH.

DR. LE CONTE also reported the following case: A man, aged fifty-four years, was admitted to the Pennsylvania Hospital, September 15, 1903, who had been ill for five days with abdominal pain, vomiting, fever, constipation, the pain localizing itself in the right iliac region during the last forty-eight hours. No previous attack of this nature. On admission his temperature was $102^{\circ}\frac{2}{5}$ ° F.; pulse, 120; respirations, 32. Abdomen prominent, rigid, and tender only in right iliac region, where an illy defined sausage-shaped mass could be made out on palpation.

The abdomen was opened through the right rectus muscle, exposing an appendix very large, much thickened, inflamed, red, and standing erect. Meso-appendix very thick and board-like. No perforation was visible in the appendix, but on one side there was a greenish spot. It contained pus and a faecal concretion the size of a chestnut. Intestines in the immediate neighborhood were in places of a gray-green color, like beginning gangrene. The appendix was removed, the surrounding abdominal cavity walled off from the green portions of the intestine, drainage inserted, and the abdominal wound partially closed. Bacterial cultures from the peritoneum showed *bacillus lactis aërogenes*. Reaction following the operation was good, and the convalescence seemed to be well established, when on September 25, ten days after the operation, he wakened from sleep in a condition of profound collapse. The weakness was extreme; pulse very feeble; breathing difficult and shallow; temperature one degree subnormal; sweating profuse. No pain. Later in the morning there was severe pain beneath the right scapula. No impairment of resonance; no friction sound or râles to be heard.

September 26. There was suppression of the breath sounds over the base of the right lung posteriorly. No impairment of resonance; no friction murmur. Temperature had risen to 103° F.; some cough; no expectoration.

September 27. Resonance impaired over right base, where the breath sounds were very feeble. Cough continues with some bright, blood-red expectoration. Leucocyte count, 16,000; pain shooting through lower part of right chest.

September 28. Physical signs over right base similar to those of a central pneumonia. Expectoration more free and still bright red. Pneumococcus and tubercle bacillus not found in sputum. Patient continued in this condition for about a week, and then a slow improvement set in, although the temperature never quite reached normal.

By the 19th of October a small, localized effusion was diagnosed over the right pleura. The sputum at this time was very copious, had lost its bloody characteristics, but was occasionally rusty. It was filled with pneumococci; breath a little offensive. Patient moderately septic with hectic temperature.

October 27. During a hard coughing spell a large quantity of foul-smelling, tenacious, yellowish material was brought up. An exploring needle was inserted into the chest and about a drachm of dark brown, thin fluid was evacuated, with a faecal odor. This fluid was loaded with streptococci and staphylococci, and with bacilli which were variously described as long and thin, short and stout, and square-ended.

October 28. Under local anæsthesia, induced by Schleich's fluid, an attempt was made to open the chest. The pleura was opened and no fluid encountered. The lung within felt hard and solid. This procedure was so painful and depressing to the patient that the operation was not persisted in. His condition at the time was profoundly septic, and it was not deemed advisable to give an anæsthetic. Owing to difficulty of respiration, he was constantly in a semirecumbent position, could not lie down.

November 1. He was again tapped and purulent fluid of a very foul odor withdrawn. He positively refused any further operative procedures, and it was not until November 5 that he consented. At this time, while in a semisitting position anæsthol was administered. After he became unconscious, it was found impossible to operate with the patient in this position, and it became nec-

essary to turn him on his left side. Just as the skin was incised there was a violent expulsive cough, and from the mouth and nostrils a quantity of foetid, greenish pus gushed out. In a second, respiration ceased and stimulation and artificial respiration failed to revive the patient. Evidently the lungs were flooded with pus by the rupture of the abscess, and he was drowned in his own secretions.

Post-mortem examination was refused.

Dr. Le Conte said that his reasons for believing this case to be one of septic embolus of a branch of the right pulmonary artery were the following:

Suddenness of onset with collapse; difficult respiration; feeble pulse; an absolute lack of physical signs at first, these developing in the following order, pain, impaired breath sounds, fever, bright bloody expectoration, impaired resonance; at first no râles and no friction murmurs. With the meso-appendix enormously thickened and inflamed at the time of operation, it is not hard to believe that a septic clot detached itself from one of these vessels and was swept into the lower branch of the right pulmonary artery.

DR. GEORGE ERETY SHOEMAKER regarded the class of cases reported by Dr. Le Conte of interest as explaining some postoperative deaths. Cases similar to the one which occurred soon after operation might be due to sudden heart failure. One peculiarity about cases of sudden death is that nearly all of them occur from a week to ten days after operation and in patients that are doing well; hence they come as a surprise. Such patients move about more than do those profoundly ill. Emboli are thus formed out of otherwise innocent local vein clots. They should teach the surgeon that it is unwise, even in simple cases of major operation, to allow the patient out of bed as early as the tenth day. Some surgeons even boast of their patients leaving the hospital on the tenth or even the fourth day; this adds to the risk. These remarks do not, of course, refer to Dr. Le Conte's cases. Dr. Shoemaker's experience with embolism is limited to one case which occurred after severe hæmorrhage due to ruptured extra-uterine pregnancy. The patient was a large woman, who had a fatty heart and had previously suffered from perinephritic abscess. Ectopic rupture occurred during the sixth week of gestation. After operation the pulse and temperature were normal at the ninth day, and the

patient was supposed to be in splendid condition. She died instantly, no doubt as the result of a clot in the pulmonary vessels, though no post-mortem was held. Most of the cases in which embolism occurs are simple in character, and for that reason the surgeon is apt to allow the patient early liberty. A similar variety of sudden death occurs after undue exertion during pneumonia.

DR. HENRY R. WHARTON mentioned a case in which he performed Schede's operation for varicose veins of the leg. The patient recovered from the anæsthetic, but in five hours developed shortness of breath and soon died. There was in this case some question as to whether there was pulmonary or cardiac embolism, as no post-mortem examination was made.

DR. LE CONTE added that cases of pulmonary embolus might be divided into two groups, the septic and the non-septic; and these again into large emboli and small ones. In some cases where the embolus is aseptic and small, one of the smaller branches of the pulmonary artery may alone be occluded, and the patient may present symptoms not dissimilar to syncope. There will be a rapid, feeble pulse, shallow respiration, sweating, and usually pain in the lung. Such cases almost invariably recover, the attending surgeon perhaps having entirely overlooked the fact that embolus has taken place. In other instances the non-septic thrombus may be so large that the entire pulmonary artery is occluded, and death is almost instantaneous.

In the septic group, if the primary thrombus is small and only a portion of the artery is occluded, the patient recovers from the immediate shock, to develop later a septic pneumonia or gangrene of the lung. In such cases, then, the patient does not die as a result of the occlusion of the vessel, but rather on account of the septic material which has been deposited in the lung.

COMPLETE INTESTINAL OBSTRUCTION FROM A BAND AND VOLVULUS OF THE ILEUM.

DR. ROBERT G. LE CONTE reported the case of a man, aged forty years, who was admitted to the Pennsylvania Hospital, July 18, 1904, with a history of four attacks of appendicitis since June, 1903, culminating in an attack in April, 1904, when a large abscess in the region of the appendix was opened, but without the removal of the appendix.

On July 14, 1904, he was again seized with nausea, vomiting, and great abdominal pain. There was great prostration. His bowels moved slightly the next day and again on the morning of admission, July 18. Vomiting was more or less constant and was of a greenish hue, but not until the evening of the 17th was there any offensive odor from the vomitus. On admission the patient was pale and haggard looking, very thin, vomiting of a projectile type, every half or three-quarters of an hour, material that was thin and stercoraceous. The abdomen was distended, rigid, universally tender, but most markedly so between the scar of the former operation and the umbilicus. Pulse weak and small; temperature normal. Diagnosis, obstruction from a band of adhesion.

The patient was immediately etherized and a four-inch incision made in the median line between the umbilicus and the pubes. The small intestine was found very much distended with numerous adhesions, the bowel being firmly adherent to the cicatrix of the previous operation. After breaking up some of the adhesions, a firm band was found compressing about three feet of the lower ileum, and this portion of the gut had taken one twist to the right. While breaking through this band and further separating the adherent gut from the abdominal wall, the friable bowel was torn. Through this perforation the liquid contents of the bowel were evacuated; the rent was then sewn up and the abdomen flushed with warm sterile salt solution and closed without drainage. The patient's condition was so precarious that no attempt was made to find the head of the colon or to explore the appendiceal region. As the abdomen was being closed, an assistant passed a stomach-tube and washed out the stomach, removing in the neighborhood of a quart of stercoraceous material. Reaction following the operation was slow, but there was no further vomiting and the sensation of nausea gradually disappeared; the pulse improved in volume and strength. Five days after operation the patient again complained of severe pain in the old appendiceal scar. The temperature, which had been normal, rose to 101° F. Inspection of the abdomen showed that there was bulging over the lower portion of the old scar, with exquisite tenderness and redness of the skin. An incision was made into this and several ounces of grumous, grayish, foul-smelling material was evacuated. A rubber tube was inserted for drainage. This material was reported by the pathologist to be more or less structure-

less and without leucocytes, resembling in its characteristics faecal material. The temperature immediately fell to normal, the pain disappeared, and there was no further discharge from the cicatrix. The convalescence from this time was uneventful, the median incision healing by primary union, and the cavity in the old scar by granulation. The patient was walking about by August 25, and was discharged from the hospital on the 29th of August in good condition with both cicatrices sound.

DR. JOHN B. ROBERTS had operated upon a similar case. The patient had had his appendix removed, and a short time later obstruction necessitated a second operation. One year later, when again suffering from obstruction, he came under the care of Dr. Roberts. Operation revealed a dense matting together of all the structures in the right iliac fossa. The intestine was kinked, a loop having passed beneath a constricting band and produced an intestinal hernia. The loop was drawn out of its bed and the patient recovered.

DR. DE FOREST WILLARD had met with several cases of obstruction following operation for appendicitis, the obstruction developing from ten days to three weeks after operation, during healing of the wound. On three occasions Dr. Willard had opened the abdomen and found cicatricial bands. In one there were two bands, one inch apart, the division of which gave the desired relief. In the second, two feet of the intestines were shut off, requiring resection; the patient recovered. In the third case, adhesions were more extensive, and in freeing them the bowel was ruptured; this patient died on the second day. In a case of inflamed ovarian cyst followed by appendicitis and obstruction after operation the intestines were found so adherent that it was impossible to separate them. Death ensued. Considering the frequency of general peritonitis, it is a wonder that obstruction does not more often follow appendicitis operations.

DR. LE CONTE said, in closing, that when a constricting band alone is present the condition is a comparatively simple one to deal with. The lumen of the intestine is cut off, but the circulation in the constricted portion is not materially interfered with. When, however, volvulus occurs, the blood supply to the intestine is cut off in the mesentery, and thrombosis of the veins will take place if the condition exists for any length of time. Thrombosis of the mesenteric veins necessitates intestinal resection, and death will

follow in the majority of cases, as the patient's condition is usually so bad that a prolonged operative procedure cannot be safely undertaken. Of six or seven cases of volvulus personally seen by the reporter, the case reported this evening was the only one saved. It is difficult to understand how volvulus occurs when the intestine is free, but the mechanism is more simple when a portion of the gut is adherent, for we can readily understand how violent peristaltic movement, when suddenly checked by an adhesion, might throw a loop of intestine around this adhesion. The recorder's opinion was that in the case reported this evening the band had probably lasted for several days, gradually constricting the intestinal lumen, but that the volvulus had perhaps been present only a few hours, as there was no evidence of the formation of clot in the mesentery veins.

OSTEOMA OF THE ORBIT.

DR. WILLIAM J. TAYLOR presented a bony growth removed from the left orbit of a boy of sixteen. The operation was done at St. Agnes's Hospital on December 21, 1903. The boy had been under observation and treatment at the Eye Department under Dr. Shoot and Dr. Perkins, who have a very elaborate history of his ocular conditions. A careful X-ray study was made also of his head, as he desires to make a more detailed report of this case in the future. The left eyeball was pushed forward, downward, and outward by a mass growing in the orbit. The boy's mental condition was gradually becoming cloudy, he was irritable, his whole disposition had changed, and he was totally unlike his former self. There were, however, no definite symptoms which could localize any growth in the brain, nor had there been any palsies other than the difficulty with the ocular muscles, which seemed to be directly due to local pressure.

An incision was made along the upper border of the eyebrow, exposing a hard bony mass, which seemed to fill the whole of the orbit. The edge of the orbital ridge was thinned out and blended in with the outline of this irregular mass of bone, which was so hard and dense, that a chisel or gouge could make no impression upon it whatever. It was, therefore, necessary to cut away the whole of the orbital ridge, and in so doing the frontal sinus was opened, from which a large quantity of glairy material exuded.

It was now found that from pressure the whole of the upper wall of the orbit had been obliterated, and the bony mass extended through the nasal cavity and into the right frontal sinus. After a good deal of difficulty, and the cutting away of a large portion of the overlying bone, it was possible to remove the mass, which is of irregular shape, and measures two and three-fourths inches by two inches. It was very dense and entirely unattached, for it remained simply in place, held by overlapping bone. Its removal left an enormous cavity and the exposure of a large area of the dura; as the pressure had entirely destroyed the borders of the orbit, there was no evidence of disease of the bone, simply erosion from pressure.

He stood the shock of the operation very well, but the wound became infected from the nasal cavities, which were exposed, and death occurred in a week from septic meningitis.

DR. DE FOREST WILLARD mentioned the case of a woman operated upon some years ago for osteosarcoma of the nose and orbit. He removed the lachrymal, nasal, ethmoid, and vomer, and even then stopped short of the full extent of the growth. The patient died eight days later of septic meningitis. The tumor probably sprung from the ethmoid. The eye was not displaced.

REVIEWS OF BOOKS.

VON BERGMANN'S SURGERY: A System of Practical Surgery. By DRs. E. VON BERGMANN, of Berlin, P. VON BRUNS, of Tübingen, and J. VON MIKULICZ, of Breslau. Edited by WILLIAM T. BULL, M.D., Professor of Surgery in the College of Physicians and Surgeons (Columbia University), New York. Volumes IV and V. Philadelphia and New York: Lea Brothers & Co., 1904.

The previous volumes of this system of surgery have been reviewed in the ANNALS OF SURGERY.

Volume IV contains more of interest and importance than any of the other three volumes which have preceded it. Treating, as it does, of the surgical diseases of the alimentary tract, including hernia, it presents the views and teachings of some of the foremost surgical minds of Europe. One has but to note the authors of the various chapters to appreciate the worth of the volume. Malformations, Injuries and Diseases of the Œsophagus by v. Hacker and Lotheissen; those of the Stomach and Intestines by v. Mikulicz and Krausch; Injuries and Diseases of the Abdominal Wall by Steinthal; Injuries and Diseases of the Liver and Biliary Passages by Kehr; of the Pancreas by Korte; of Hernia by Graser; and Laparotomy by v. Mikulicz and Krausch.

Probably the most interesting chapters are those by v. Mikulicz and Professor Kehr, although the contributions of the others are by no means inferior. It is also to be noted that in this volume the names of the authors of the various chapters are given, an omission which somewhat detracted from the value of Volume II.

The translators have chosen a very pleasing method of pre-

senting the text of the various authors, eliminating the ego, and emphasizing the name of the author.

In the American edition the more important illustrations of our own authors have been freely drawn upon. Those of Huntington, Mayo, Finney, Stimson, Senn, Richardson, and others are found. The illustrations of gastrostomy are very good, and here, as in many other places, do away with a complicated description of the various operations for the same, whereby the meaning is made plain without much mental effort.

Volume V treats of the Surgery of the Pelvis and Genitourinary Organs. Malformation, Injuries and Diseases of the Pelvis come from the pen of Steinthal; of the Urethra and Penis by Körte and Rammstedt; of the Kidneys and Ureter by Schede; of the Bladder and Prostate by Nitze and Sonnenburg; of the Scrotum, Testicles, etc., by v. Bramann.

The chapter on Diseases of the Prostate is not up to the standard of the other chapters by the same authors. This is probably due to the fact that the original was published before the recent advances in this branch of surgery took place. It is also indicative of the fact that the German surgeons have not been the pioneers in this work.

Volume V contains, in addition to its own special index, a general index. There is no section of the work devoted to Gynecology.

The translators are to be congratulated upon the success of their work, which has been accomplished so well.

The value of the work has increased with each volume, and completed forms a system not alone valuable to the student, but of encyclopædic interest to the specialist. Here are to be found in a comparatively small space the opinions of the leading German surgical authorities concisely and carefully stated, and revised and edited by an American surgeon whose judgment and experience have greatly increased the value of the original work.

PAUL MONROE PILCHER.

LES TUMEURS MALIGNES PRIMITIVES DE L'INTESTIN GRÊLE (JEJUNO-ILEON). Par le DOCTEUR P. LECÈNE, Interne Laureat des Hôpitaux de Paris, Prix Ciriale (1903), Médaille d'Or (1904), Prosecteur à la Faculté, Membre de la Société Anatomique. Paris: G. Steinheil, Editeur, 2, Rue Casimir-Delavigne, 1904.

In this brochure we have the first efforts of the French school of medicine to throw light on this subject, to which our American confrères, judging from the repeated use of their names, have taken the initiative and contributed liberally.

The first half of the book covers a description of the sarcomata. The second half embraces an account of the carcinomata.

The sarcomata may be of any variety, are associated with metastases of the mesenteric lymph glands and all the other organs of the abdomen and thorax and the marrow of the long bones. The favorite seat of this disease is in the ileum, and the males are represented as being afflicted twice as often as the females. The seventy-six cases described show the disease to be most common between the ages of twenty to thirty; yet there are thirteen instances reported of its occurrence in infants, and even one case in the newborn.

The symptoms are not well defined; yet a most striking symptom is the absence of any intestinal obstruction, accounted for by a dilatation of the bowel at the site of disease, accompanied by ganglionic enlargements, which have been the findings at post-mortem. Among other symptoms are constipation alternating with diarrhoea, colicky pains, a cachexia appearing very early and remarkably rapid in its progress.

Death ensued in 89 per cent. of the cases from acute intestinal obstruction or perforative peritonitis. Only once has the correct diagnosis been made, and but two of the cases operated were free from recurrence many years later.

Epithelioma of the small intestine, on the other hand, is more frequent in the advanced years. The growth is small and difficult

to palpate. Pathologically, it is of cylindrical type and takes its origin in the follicles of Lieberkühn.

In 44 per cent. of the cases epithelioma was multiple. This fact, together with symptoms of complete obstruction, help to differentiate it from carcinoma. Pains are very marked in epithelioma and cachexia.

The progress of epithelioma is very much slower than that of sarcoma. In a child of three years afflicted with epithelioma the disease lasted two months; others survived the disease two years.

The diagnosis of epithelioma is even more difficult than that of sarcoma. Of the six cases but one was cured and no recurrence took place. On this subject, too, Americans have contributed the greater share.

The remainder of the book gives a detailed account of the original publications which are the basis of the monograph. There is but one illustration and several statistical tables.

MARTIN W. WARE.

INTERNATIONAL CLINICS. Edited by A. O. J. KELLY, A.M., M.D.
Volumes II and III. Philadelphia: J. B. Lippincott Company, 1904.

Both of these volumes contain much of surgical interest. This publication is so well and widely known that a general description of the character of its contents is not necessary. The first of these two volumes contains a symposium upon tropical diseases. Liver abscess is presented in an excellent article on that subject by Dr. James Cantlie. He divides these cases under the heads of suprahepatic abscess, intrahepatic abscess, and subhepatic abscess. The second of these varieties, he says, is usually due to dysentery, and the presumption is in favor of an embolus, carried to the liver substance by way of the portal vein. This belief is supported by the fact that an ulcerated surface in the colon is usually found to be the starting-point of a phlebitis. Further-

more, these abscesses are apt to be triangular or wedge shaped, with the apex towards the gate of the liver. The best treatment is the earliest possible evacuation of the pus. The diagnosis should be confirmed and the abscess located by the aspirating needle, and this followed by the introduction of the trocar and cannula, carrying a rubber drainage tube to be left *in situ*. This should be done before the abscess has reached the surface. The author insists that when a cutting operation for abscess of the liver becomes necessary, operation has been put off too long; and the very fact that the operation has been performed (however successfully) is condemnatory, as it points to lack of diagnostic skill or to delay in reaching the pus while it was as yet deeply seated. The author has operated upon fifty-three cases by the use of the trocar and drainage tube.

Another article of value is by Mr. James Edwin Thompson on the diagnosis and treatment of abscess of the liver, based upon an observation of twenty-one patients suffering with abscess of the liver. These cases occurred in Texas. Fifteen had a previous history of dysentery. Nine died and six recovered. Autopsies on six of the fatal cases showed lesions in the colon in four cases. The author lays down a group of characteristic symptoms. These are: a history of dysentery; a general feeling of malaise; elevated temperature; a yellow, sallow appearance of the skin, at times approaching to jaundice; pain in the hepatic region, or over the shoulder-blade, or at the acromion process, or at all three places; enlargement of the liver, upward, downward, or in both directions; tenderness over the liver; bulging of the intercostal spaces; œdema over the lower costal zone; and irritating, spasmodic cough. Rarely are all of these symptoms present in the same case, but most of them will be found in advanced cases.

A chapter on ankylosed joints and their non-operative treatment is contributed by Dr. J. Torrance Rugh. This is fully illustrated. Another paper worthy of note is by Mr. E. Stanmore Bishop on abdominopelvic diagnosis. A most excellent paper on

intestinal obstruction in children is by Dr. Charles Greene Cumston; and another on injuries of the kidney by Dr. Miles F. Porter.

Volume III contains a symposium of articles on syphilis. The section on surgery contains a noteworthy paper by Dr. Thomas H. Manley on umbilical hernia in the female, with the report of three cases of the strangulated variety. The first two of these cases died after operation, the third recovered, and serves to illustrate the application of the best judgment and wisest surgical methods that can be applied to this serious condition. In a chapter on foreign bodies in the bronchi, Drs. Lermoyez and Guisez report two cases. One case was that of a prune stone in a bronchus and the other was that of an upholsterer's nail. The first died; the second was saved by the introduction of a bronchoscope through an opening in the trachea, the location of the nail and its extraction by means of an electromagnet. Dr. Charles Greene Cumston presents an article on the pathology and operative treatment of acute osteomyelitis and osteosarcoma.

Many of these articles are in the form of clinical lectures, and bring the reader into the atmosphere of the clinic. Medicine, surgery, and their special divisions all receive consideration. The work is especially valuable to the practitioner. It is really a post-graduate course in medicine.

JAMES P. WARBASSE.

CORRESPONDENCE.

THE OPERATIVE TREATMENT OF CANCER OF THE BREAST.

EDITOR OF ANNALS OF SURGERY:

In his exhaustive and carefully prepared article on "The Operative Treatment of Cancer of the Breast," which appeared in the issue of the ANNALS OF SURGERY for December, 1904, Dr. J. Collins Warren, of Boston, says as follows: "In the greater portion of the second series the method known as the Halsted operation was conscientiously followed. Latterly, however, *i.e.*, during the past year, I have adopted the method given below, and find it one that I can recommend as both safe and thorough, etc."

The operation described by Dr. Warren, as adopted within the last year, is in every essential the operation which I published in the *New York Medical Record* of December 15, 1894, in a paper which was read before the Section on Surgery of the New York Academy on November 12, 1894.

Though cognizant of the merits of Halsted's operation, I have always within the last ten years emphasized my conviction that my operation, which was published simultaneously, but entirely independently, from that of Halsted, could be claimed to be the more anatomical one. And this for the reason that the operator works from the axilla towards the thorax, from the tendons towards the origin of the pectoral muscles in an almost bloodless way. Almost bloodless, because he can thus secure the vessels at their exit and entrance from and to the axillary and subclavian vessels.

Since 1894 I have taken occasion to discuss my method whenever presenting patients thus operated upon before various societies, in particular before the New York Surgical Society, the

Transactions of which are published in the ANNALS OF SURGERY (*cf.* also Charles N. Dowd, "A Study of Twenty-nine Cases of Cancer of the Breast submitted to Operation," ANNALS OF SURGERY, 1898, Vol. xxvii, page 285).

For the last meeting of the American Medical Association (Atlantic City, June, 1904), I had announced a paper, "Ten Years' Experience with My Radical Operation for Carcinoma of the Breast." The title appeared in the provisional programme. To my sincere regret, I had to forego the pleasure of reading it for special reasons. It was due to the courtesy of the Chairman of the Section on Surgery, Dr. Charles A. Powers, that I could briefly outline my operation, as I am carrying it out to-day. In introducing my remarks I said that I had hoped to discuss Dr. Warren's paper on carcinoma of the breast, the title of which appeared on the official programme. Unfortunately, Dr. Warren's paper was not read. (*cf.* Journal of the American Medical Association, Report of June 25, 1904.)

Since then I have read my article, previously announced, before the meeting of the New York State Medical Association, October 18, 1904, and before the Section on Surgery of the New York Academy of Medicine, November 4, 1904, showing every step of the operation in drawings, reproduced from photographs of dissections on the cadaver.

I can only account for the omission of my name in connection with the operation now described by Dr. Warren on the ground that he did not append any bibliography in his article. The evolution of this operation I have demonstrated to many American and European colleagues in my hospital and private work in the course of the last ten years.

WILLY MEYER, M.D.

DECEMBER 20, 1904.